

PROCEEDINGS  
OF THE  
AMERICAN SOCIETY  
OF  
CIVIL ENGINEERS  
(INSTITUTED 1852)

---

VOL. XLI—No. 5  
MAY, 1915

---

Edited by the Secretary, under the direction of the Committee on Publications.  
Reprints from this publication, which is copyrighted, may be made on condition that  
the full title of Paper, name of Author, page reference, and date  
of presentation to the Society, are given.

---

CONTENTS

Society Affairs.....	Pages 327 to 396.
Papers and Discussions.....	Pages 1017 to 1292.

---

NEW YORK 1915

Entered according to Act of Congress, in the year 1915, by the AMERICAN SOCIETY OF  
CIVIL ENGINEERS, in the office of the Librarian of Congress, at Washington.

# American Society of Civil Engineers

## OFFICERS FOR 1915

President, CHARLES D. MARX

Vice-Presidents

Term expires January, 1916:

CHARLES F. LOWETH  
GARDNER S. WILLIAMS

Term expires January, 1917:

DANIEL BONTECOU  
CLEMENS HERSCHEL

Secretary, CHARLES WARREN HUNT

Treasurer, LINCOLN BUSH

Directors

Term expires January,  
1916:

JAMES H. EDWARDS  
HENRY W. HODGE  
LEONARD METCALF  
HENRY R. LEONARD  
EDWARD H. CONNOR  
SAMUEL H. HEDGES

Term expires January,  
1917:

GEORGE W. FULLER  
ARTHUR S. TUTTLE  
CHARLES H. KEEFER  
MORTIMER E. COOLEY  
EUGENE E. HASKELL  
RICHARD MONTFORT

Term expires January,  
1918:

JOHN V. DAVIES  
GEORGE A. HARWOOD  
J. E. GREINER  
JOHN F. COLEMAN  
JOHN B. HAWLEY  
HERBERT S. CROCKER

Assistant Secretary, T. J. McMINN

## Standing Committees

(THE PRESIDENT OF THE SOCIETY IS *ex officio* MEMBER OF ALL COMMITTEES)

On Finance:

HENRY W. HODGE  
CLEMENS HERSCHEL  
GEORGE W. FULLER  
LEONARD METCALF  
JOHN F. COLEMAN

On Publications:

JAMES H. EDWARDS  
ARTHUR S. TUTTLE  
J. E. GREINER  
HENRY R. LEONARD  
GARDNER S. WILLIAMS

On Library:

GEORGE A. HARWOOD  
JOHN V. DAVIES  
HERBERT S. CROCKER  
M. E. COOLEY  
CHAS. WARREN HUNT

## Special Committees

ON CONCRETE AND REINFORCED CONCRETE: Joseph R. Worcester, J. E. Greiner, W. K. Hatt, Olaf Hoff, Richard L. Humphrey, Robert W. Lesley, Emil Swensson, A. N. Talbot.

ON ENGINEERING EDUCATION: Desmond FitzGerald, Onward Bates, D. W. Mead.

ON STEEL COLUMNS AND STRUTS: Austin L. Bowman, James H. Edwards, Charles F. Loweth, Rudolph P. Miller, Ralph Modjeski, Frank C. Osborn, George H. Pegram, Lewis D. Rights, George F. Swain, Emil Swensson, Joseph R. Worcester.

ON MATERIALS FOR ROAD CONSTRUCTION: W. W. Crosby, A. W. Dean, H. K. Bishop, A. H. Blanchard, George W. Tillson, Nelson P. Lewis, Charles J. Tilden.

ON VALUATION OF PUBLIC UTILITIES: Frederic P. Stearns, Charles S. Churchill, Leonard Metcalf, William G. Raymond, Henry E. Riggs, Jonathan P. Snow, William J. Wilgus.

TO INVESTIGATE CONDITIONS OF EMPLOYMENT OF, AND COMPENSATION OF, CIVIL ENGINEERS: Nelson P. Lewis, S. L. F. Deyo, Dugald C. Jackson, William V. Judson, George W. Tillson, C. F. Loweth, John A. Bensel.

TO CODIFY PRESENT PRACTICE ON THE BEARING VALUE OF SOILS FOR FOUNDATIONS, ETC.: Robert A. Cummings, Edwin Duryea, Jr., James C. Meem, Walter J. Douglas.

ON A NATIONAL WATER LAW: F. H. Newell, George G. Anderson, Charles W. Comstock, Clemens Herschel, W. C. Hoad, Robert E. Horton, John H. Lewis, Charles D. Marx, Gardner S. Williams.

ON FLOODS AND FLOOD PREVENTION: C. McD. Townsend, John A. Bensel, T. G. Dabney, C. E. Grunsky, Morris Knowles, J. B. Lippincott, Daniel W. Mead, John A. Ockerson, Arthur T. Safford, Charles Saville, F. L. Sellew.

TO REPORT ON STRESSES IN RAILROAD TRACK: A. N. Talbot, A. S. Baldwin, J. B. Berry, G. H. Bremner, John Brunner, W. J. Burton, Charles S. Churchill, W. C. Cushing, Robert W. Hunt, George W. Kittredge, Paul M. LaBach, C. G. E. Larsson, William McNab, G. J. Ray, Albert F. Reichmann, F. E. Turneure, J. E. Willoughby.

The House of the Society is open from 9 A. M. to 10 P. M. every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

HOUSE OF THE SOCIETY—220 WEST FIFTY-SEVENTH STREET, NEW YORK.

TELEPHONE NUMBER.....1446 Circle.  
CABLE ADDRESS....."Ceas, New York."

# AMERICAN SOCIETY OF CIVIL ENGINEERS

INSTITUTED 1852

## PROCEEDINGS

This Society is not responsible for any statement made or opinion expressed in its publications.

### SOCIETY AFFAIRS

#### CONTENTS

	PAGE
Minutes of Meetings:	
Of the Society, April 21st and May 5th, 1915.....	327
Of the Board of Direction, May 5th, 1915.....	329
Society Items of Interest.....	331
Announcements:	
Hours during which the Society House is open.....	339
Future Meetings.....	339
Annual Convention.....	339
Searches in the Library.....	339
Papers and Discussions.....	340
Local Associations of Members of the American Society of Civil Engineers.....	341
Minutes of Meetings of Special Committees.....	346
Privileges of Engineering Societies Extended to Members.....	348
Accessions to the Library:	
Donations.....	351
By purchase.....	357
Membership (Additions, Changes of Address, Deaths).....	359
Recent Engineering Articles of Interest.....	370

### MINUTES OF MEETINGS

#### OF THE SOCIETY

**April 21st, 1915.**—The meeting was called to order at 8.30 P. M.; T. Kennard Thomson, M. Am. Soc. C. E., in the chair; T. J. McMinn, Assistant Secretary, acting as Secretary; and present, also, 111 members and 14 guests.

A paper by Adolph F. Meyer, M. Am. Soc. C. E., entitled "Computing Run-Off from Rainfall and Other Physical Data" was presented by the author and illustrated with lantern slides. The author also presented and commented on written discussions by Messrs. Joel D. Justin, A. M. Strong, E. F. Chandler, and T. U. Taylor.

Arthur S. Tuttle, M. Am. Soc. C. E., Chairman of the Committee of Engineers representing National and Local Professional Engineering Societies, reported to the meeting the action of that Committee in reference to the revision of the Constitution of New York State,

stating the principles which should be observed and the recommendations of the Committee to the State Constitutional Convention.

The Assistant Secretary announced the following deaths:

WILLIAM HARLIN KENNEDY, of Pittsburgh, Pa., elected Member, September 6th, 1871; died March 14th, 1915.

MAURICE AUGUSTUS VIELÉ, of New York City, elected Junior, February 4th, 1891; Associate Member, September 7th, 1892; Member, October 6th, 1897; died April 10th, 1915.

FRANCIS HOPKINSON SMITH, of New York City, elected Associate, April 5th, 1892; died April 7th, 1915.

Adjourned.

**May 5th, 1915.**—The meeting was called to order at 8.30 P. M.; Vice-President Gardner S. Williams in the chair; T. J. McMinn, Assistant Secretary, acting as Secretary; and present, also, 115 members and 19 guests.

The minutes of the meetings of March 17th and April 7th, 1915, were approved as printed in April, 1915, *Proceedings*.

A paper entitled "Temperature Changes in Mass Concrete", by Charles H. Paul, M. Am. Soc. C. E., and A. B. Mayhew, Assoc. M. Am. Soc. C. E., was presented by the Assistant Secretary, and the subject was discussed by Messrs. Wilson Fitch Smith, George T. Seabury, J. Waldo Smith, T. Kennard Thomson, Gardner S. Williams, and G. Immediato.

The Assistant Secretary announced the following deaths:

JOHN MAXWELL SHERRERD, of Pittsburgh, Pa., elected Member, July 10th, 1907; died April 15th, 1915.

GEORGE FREDERIC SIMPSON, of New York City, elected Member, March 2d, 1887; died April 23d, 1915.

MORTON LOUDON TOWER, of Eureka, Cal., elected Associate Member, May 6th, 1908; Member, July 1st, 1909; died April 15th, 1915.

Adjourned.



## OF THE BOARD OF DIRECTION

(Abstract)

**May 5th, 1915.**—The Board met at 9.30 A. M.; President Marx in the chair; Chas. Warren Hunt, Secretary; and present, also, Messrs. Bontecou, Bush, Coleman, Crocker, Davies, Edwards, Fuller, Harwood, Haskell, Hawley, Herschel, Hodge, Keefer, Leonard, Loweth, McDonald, Montfort, Ockerson, Swain, Tuttle, and Williams.

The following appropriations for the work of Committees were made on the recommendation of the Finance Committee:

Special Committee on	Steel Columns and Struts.....	\$1 000
"	"	" Materials for Road Construction. 800
"	"	" Valuation of Public Utilities... 800
"	"	" A National Water Law..... 2 000
"	"	" Stresses in Railroad Track..... 4 500
"	"	" Employment and Compensation
	of Engineers.....	400
"	"	" Floods and Flood Prevention.... 500

The following resolution was adopted:

*"Resolved:* That unless especially authorized by the Board of Direction, it is the sense of this Board that mileage should not be allowed to members of Committees attending meetings held at the same time and place as the meetings of this or other societies, or at cities where expositions are being held."

The payment of \$10 000 on the principal of the mortgage of the Society was authorized.

An appropriation of \$5 000 to cover necessary repairs and depreciation on the Society House was made, and the expenditure of this amount placed in the hands of the Library Committee.

The matter of the action taken by the Society in regard to the Licensing of Engineers was considered, and the following resolution was adopted:

*"Resolved:* That the whole matter be referred to letter-ballot of the Society, with a recommendation from the Board of Direction that the previous action in regard to the Licensing of Engineers adopted by the Society in Annual Meeting be rescinded, so that the Board may be free to act in this matter as occasion may demand."

The President was authorized to appoint a Committee of the Board to report upon a revision of the entire Constitution of the Society, such Committee to have the power, in its discretion, of ascertaining the views of the membership on any matter before its incorporation in the proposed revision.

The question of the admission of women to the Society, and all other questions which have been under consideration by the Board and which will require Constitutional amendment, were referred to this Committee.

A Report of the Nominating Committee was received, and the following resolutions adopted:

*"Resolved:* That it is the sense of this Board that there is no reason why secrecy in regard to the candidates selected should be maintained, but that the Constitutional requirement as to the official notification of the members of the action taken by the Nominating Committee should be carried out as usual; that is, that the list of nominees should not be officially sent out until directly after the first day of October."

A Report was received from the Chairman of the Conference of Presidents of Local Associations held at the time of the last Annual Meeting, together with certain recommendations as to District Organizations in the Society which had been adopted by that Conference, and had been referred to the 14 Local Associations for report. The comments received from these Associations were reported in full.\*

This whole matter was referred to the Committee on Revision of the Constitution when appointed.

A letter from General Grenville Mellen Dodge, Hon. M. Am. Soc. C. E., was read to the Board.†

The Constitutional provision in regard to members in arrears for dues was allowed to take effect in the cases of 14 Members, 15 Associate Members, 15 Juniors, and 1 Associate, who had been in arrears for four years.

The resignations of 1 Member and 1 Associate were accepted, the former as taking effect December 31st, 1915.

The Report of Tellers on Membership Ballot canvassed April 7th, 1915, was received, which resulted in the election of 12 Members, 46 Associate Members, 20 Juniors, and the transfer of 16 Juniors to the grade of Associate Member.

Eleven Associate Members and 2 Associates were transferred to the grade of Member.

Applications were considered, and other routine business was transacted.

Adjourned.

---

\* See page 337.

† See page 331.

## SOCIETY ITEMS OF INTEREST

**Letter from Gen. Grenville Mellen Dodge, Hon. M. Am. Soc. C. E.**

On March 2d, 1915, Gen. Grenville Mellen Dodge was elected an Honorary Member of the Society, and the following letter from him, in reply to the official notification of his election, is printed for the information of the Membership.

"COUNCIL BLUFFS, IOWA,

"April 19, 1915.

"CHAS. WARREN HUNT, *Secretary*,

"AMERICAN SOCIETY OF CIVIL ENGINEERS,

"220 West 57th Street, New York City.

"MY DEAR SIR:

"When I received your notice on March 3, 1915, of my election as an Honorary Member of the American Society of Civil Engineers, I was, from sickness, unable to make a proper acknowledgment—could simply return my thanks and acceptance.

"I fully appreciate the great honor conferred upon me, especially as it has the unanimous approval of the Board of Directors of the Society and of all the living Past-Presidents.

"Since the receipt of your letter, I have received many personal letters from members stating that they had recommended my appointment. It was a great gratification to find that many of them knew me in earlier days and had been connected with me, and to see the high positions to which they have risen in their profession.

"Since I was nineteen years old, and until I retired in 1908, I have been actively and continuously on duty in some capacity in my profession, and it has given me an opportunity to see what it has accomplished.

"In the '50's and '60's, my duties were mostly west of the Mississippi River, in exploring the country to Montana, Oregon, California; and in the '70's in Louisiana, Texas, New Mexico, Arizona and Southern California, and I am greatly pleased that Civil Engineers universally made good. I have seen many instances where they lost their lives in contest and fights with the Indians, but I have not known of a case where the Chiefs of the parties did not meet bravely the attacks, and generally successfully, though many very promising young men fell in the fights while performing their duties.

"The Civil Engineers in the Civil War have never been given credit they were entitled to; their brave and valuable services were performed under many disadvantages and discouraging conditions. When the Military Commands were organized and put in the field, there was a great demand for engineers. We had no power to commission them or enlist them. Therefore we had to make details from the different commands, and they were often enlisted men and usually they showed great adaptation for their work and ability and bravery in mapping the country in advance, tracing and making roads, and handling the pioneer corps in their duties.

"They were universally reported for promotion by their superior officers, but for the fact that they were detailed from their companies

and regiments, state authorities refused to promote them in their regiments, and these young engineers of brigades, divisions, and in one case, of corps, were enlisted men but were given commands and were universally recognized. One of the prominent engineers of my corps was an enlisted man of the 2nd Iowa. He was named 'Major', by the men, by which title he was known and acknowledged yet when he left the service at the end of the War, he was mustered out as an enlisted man with an enlisted man's pay, and afterwards became a prominent engineer in building the Pacific roads as well as the Canadian Pacific. Many of these young engineers, after the War, rose to the height of their profession and held high positions.

"After the Civil War, the duties of Civil Engineers greatly changed. Before the War, the Engineer had experience in all the departments of his profession,—in preliminary location, construction, architecture, bridges, shops, permanent structures and terminals. Since the War, all these different duties have fallen to experts, who, by study and practice, have become efficient, and four or five engineers now perform the duties that fell to the engineers in the earlier days, showing a great progress in the profession.

"One of the great satisfactions and pride of my life has been to watch how promptly our engineers tackled and mastered the great problems in developments and internal improvements which these modern times have presented and made necessary. I have often thought if, as a young engineer, I could have had the advantage of belonging to an engineering society and conferring with my comrades and hearing the discussions of any subject that was brought up, what a great benefit it would have been to me.

"But in those days, our duties were far away from any such organizations, and I can appreciate what your Society means to, and as a benefit of, the engineers of our day. And I am glad to see and know what a great Society it is, and how successful it is performing its duties.

"And I wish to express to you and to the Society and all those friends individually who have taken a personal interest in my appointment, my gratitude and appreciation, holding it as I do, one of the greatest honors paid me because it comes from my own profession.

"I am with great respect, cordially,

"Your Obedient Servant,

"GRENVILLE M. DODGE."

#### **New York State Constitutional Convention**

On January 6th, 1915, the Board of Direction appointed Messrs. Arthur S. Tuttle, Henry W. Hodge, and Alfred D. Flinn to represent the Society in engineering matters before the New York State Constitutional Convention to be convened on April 15th, 1915.

Acting jointly with representatives from the American Institute of Electrical Engineers, the American Society of Mechanical Engineers, the American Institute of Consulting Engineers, the Municipal Engineers of the City of New York, and the Brooklyn Engineers' Club (and also, informally, with representatives of the American Institute

of Mining Engineers), the following suggestions relative to changes in the State Constitution have been presented to the Convention:

"NEW YORK, April 20, 1915.

*"To the New York State Constitutional Convention.*

"There are few functions of government of greater importance than the administration of Public Works and the regulation of Public Utilities. The former embraces such great undertakings as the new Barge Canal and the State highways. The latter includes the supervision of the corporations engaged in operations intimately connected with the prosperity, health and comfort of all our citizens.

"Under the present Constitution, the way is open for each two-year administration to change completely the management of enterprises which involve operations extending over long terms of years and which can be carried out efficiently and economically only through adhering to well considered plans determined at the outset. Under current practice, changes often are due not to proven incapacity of superseded officials, nor to established merit of their successors, but rather to political expediency. In private business, changes of this character often result in bankruptcy. The principle of continuity was recognized when the Public Service law was enacted, but it has not been written into the Constitution, and until this shall have been done, the method of applying it will be subject to the varying views of the successive Governors and Legislatures.

"Professional engineers are conversant with existing defects in the administration of public works and the regulation of public utilities. In order that the Convention might have the benefit of engineers' views, a public discussion was held in March in which New York members of national engineering societies participated. This has been followed by conferences of committees representing the national societies, and finally by the formation of a Joint Committee including in its membership the national and two local societies. The national societies have about 30,000 members, of whom nearly 6,000 are residents of New York State, while the local societies' membership is about 1,000. The statement of principles and the recommendations transmitted herewith express the views of these committees and we believe that they are entitled to careful consideration by the Convention.

"Since engineering works and organizations are unfamiliar matters to many persons, and have not heretofore been given substantial recognition in our State Constitution, the necessity for our recommendations may not at first be fully apprehended. For this reason, and because of the very large expenditures involved, and on account of the numerous interests affected, we earnestly and disinterestedly urge a very careful study of these governmental functions. Small as well as large investors are vitally concerned. Moreover, state finance and credit are deeply influenced by the wise and economical, or the ill-advised and inefficient administration of public works and regulation of public utilities. We are in accord with a conservative tendency in the Convention, and believe that the Constitution should be as brief as may be and should deal mostly with principles of government, rather than with details of organization, but we are persuaded

that the technical developments of the period which has intervened since the present Constitution was adopted has introduced into government large problems in connection with public works and utilities requiring legislation which should be based on constitutional provisions.

"We trust that these views will have careful consideration and will commend themselves to the Convention. We request opportunities to present before the committees to which these matters may be referred reasons in support of our recommendations. Our services are freely at the disposal of your committees to the end that a structure of efficient and economical State Government may be built on a firm and enduring basis.

"Very respectfully,

"Committee of Engineers:

"ARTHUR S. TUTTLE	}	<i>for American Society of Civil Engineers</i>
HENRY W. HODGE		
ALFRED D. FLINN		
"GANO DUNN	}	<i>for American Institute of Electrical Engi- neers</i>
RALPH D. MERSHON		
WILLIAM McCLELLAN		
"ARTHUR M. GREENE, JR.	}	<i>from American Society of Mechanical Engi- neers</i>
CHARLES WHITING BAKER		
E. GYBBON SPILSBURY		
"RALPH D. MERSHON	}	<i>for American Institute of Consulting Engi- neers</i>
CHARLES W. LEAVITT, JR.		
ALTEN S. MILLER		
"ALFRED D. FLINN	}	<i>for Municipal Engi- neers of The City of New York</i>
GEORGE W. TILLSON		
ERNEST P. GOODRICH		
"NELSON P. LEWIS	}	<i>for Brooklyn Engineers' Club</i>
WILLIAM W. BRUSH		
JACOB S. LANGTHORN		

"ARTHUR S. TUTTLE, *Chairman*,  
"220 West 57th St., New York.

"CALVIN W. RICE, *Secretary*.

"E. J. MEHREN, *Assistant Secretary*.

"P. S.—A Committee of the American Institute of Mining Engineers, consisting of W. L. Saunders, Benjamin B. Lawrence, and J. Parke Channing, collaborated in the preparation of the 'principles' and 'recommendations'. Individually, the members of this committee approved them. Pending consideration by the Governors of the Institute, the committee is unable to subscribe officially.

"PRINCIPLES TO BE OBSERVED IN AMENDING THE CONSTITUTION OF  
NEW YORK STATE.

"The Constitution should insure:

"(a) A short ballot, making possible close scrutiny of the qualifications of all candidates and concentrated responsibility of elected officers.



"(b) Tenure of office for all elected officials, for heads of departments, and for bureau heads, of sufficient duration to attract competent men and to permit them to become increasingly efficient in the discharge of their duties.

"(c) A continuing policy in the organization and control of all departments, so that appropriations may be spent most economically and work carried on most efficiently.

"(d) Selection of heads of departments by appointment instead of election by popular vote.

"(e) Ample opportunity for the proper development of natural resources.

"(f) Recognition of the value of technical advice through the inclusion of professional engineers in the membership of Departments or Courts where such advice is essential to the proper conduct of the work or adjudication of the matters involved.

#### "RECOMMENDATIONS.

"1. The elective office of the State Engineer and Surveyor should be abolished, and the duties should be transferred to the Department of Engineering and Public Works hereinafter proposed.

"2. A Department of Engineering and Public Works should be created to be headed by three commissioners appointed by the Governor, each to have a twelve-year term of office so arranged that a vacancy will be created every four years immediately after the inauguration of a new Governor. Commissioners should be eligible for reappointment. At least one commissioner should be a professional engineer in good standing in his profession, and each should have had experience that would fit him for the duties of the office. At least one and not more than two commissioners should be residents of New York City.

"This Department should have charge of public lands and boundary surveys; of buildings, parks, highways, canals, and other public works, including design, construction, maintenance, and operation; and of the conservation and development of State resources.

"This Department should be divided into suitable bureaus. Each bureau charged with responsibility for engineering work should be headed by a Chief Engineer selected by the commissioners with sole regard to his peculiar fitness for the duties of the bureau.

"3. A Department of Public Utilities should be created to be headed by five commissioners appointed by the Governor, each to have a ten-year term of office so arranged that a vacancy will be created every two years. Commissioners should be eligible for reappointment. At least two Commissioners should be professional engineers in good standing in the profession. Each appointee should have had experience in connection with public utilities which would fit him for the duties of the office. At least two and not more than three commissioners should be residents of New York City.

"This Department should regulate and supervise all common carriers, all water supply, irrigation, drainage, gas, power, lighting, heating, intelligence-transmitting and other public utility corporations operating within the limits of New York State, including similar activities on the part of any other State department or political subdivision of the State.

"This department should be divided into such bureaus as may be

essential. Each engineering bureau should be administered by a Chief Engineer selected with sole regard to his peculiar fitness for the office, and he should have power, subject to the approval of the commissioners, to select and appoint such division engineers as are essential to the proper conduct of his office.

"4. In case provision be made in the Constitution for the creation of one or more departments or commissions charged with responsibility for regulating, supervising, and inspecting buildings and the equipment thereof, trades, mines, industries or labor, each such department or commission should include in its membership at least one professional engineer in good standing in his profession. Commissioners should be appointed by the Governor. Each appointee should have had experience and should possess qualifications fitting him to perform the duties essential to the department or commission.

"5. In case provision be made in the Constitution for the creation of a Court or Board of Claims charged with responsibility for investigating claims against or on behalf of the State, one-third of the membership of such Court or Board should be made up of professional engineers in good standing in the profession, each to have practiced professional engineering for at least ten years and for at least five years to have had responsible charge of important engineering work either as to design or execution.

"6. Removal by the Governor of any commissioner should be made only after the filing of charges and after affording the accused an opportunity to be heard in the matter, provided, however, that at any time within the first six months after making an appointment the Governor may exercise the power of summary removal. A successor to a commissioner who has been removed should be appointed to fill the unexpired term. Vacancies caused by removal or otherwise should be filled under conditions similar to those governing original appointment.

"7. There should be no direct or implied prohibition against legislation which would permit the reference by a court of technical matters made the subject of, or incidental to litigation, to a referee expert in such technical matters, for the purpose of securing a determination concerning the facts, or which will prevent the court from selecting independent expert witnesses or advisers in matters of this character.

"8. In order to make possible the reasonable development of State resources, the present Constitutional prohibition against the use or sale of land and cutting of trees within the limits of the Forest preserve should be removed in so far as such use or sale of land or cutting of trees is essential to such development (Article VII, Section 7), and similarly to permit the development of other natural resources by private enterprise, provision should be made for the condemnation of private property necessary to the construction and operation of works for irrigation, drainage, sanitation, water supply, agriculture, mining, forestry, or power development, through the declaration of such project as *for public use*, subject, however, to the superior right of the State or of a subdivision thereof to condemn the same property or a portion thereof for State or municipal purposes (Article I, Section 7)."



### **Proposed Meeting Outside of New York City**

The Board of Direction has had under advisement the matter of holding one of the regular meetings of the Society at some point outside of New York City at some date between the Annual Meeting and the Annual Convention in September. Communications on this matter have been forwarded to each of the Local Associations of Members, but, inasmuch as there seems to be no particular desire on the part of the membership in any locality to have such a meeting, and also as it is now somewhat late in the season, it has been decided to abandon the idea for this year.

### **Proposed Reserve Corps of Engineers**

General Leonard Wood, U. S. A., some time ago suggested to the Board of Direction that the Society take up the question of the feasibility of the formation of a Reserve Corps of Engineers which would be available in case of emergency, and the Board has appointed Messrs. William Barclay Parsons, of New York City, A. M. Hunt, of San Francisco, Cal., Frank S. Washburn, of Nashville, Tenn., Samuel H. Hedges, of Seattle, Wash., and Charles L. Strobel, of Chicago, Ill., as a Committee to confer with General Wood, to consider and report upon the whole question.

### **Proposed District Organizations in the Society**

At the last Annual Meeting, at the invitation of the Board of Direction, a Conference of the Presidents of the fourteen Local Associations of Members of the Society was held, and that Conference formulated recommendations which were then forwarded to each of those organizations for discussion and report. At a meeting of the Board of Direction, May 5th, 1915, a codification of the replies received was presented. For the information of the membership it may be briefly stated that the replies show that ten of the fourteen Associations, with a total membership of 788, and an estimated membership in the territory covered by these Associations of 1709, have expressed themselves in favor of the recommendations; and that four Associations, representing a membership of 245, and an estimated membership in the territory covered by these Associations of 589, have expressed themselves as not in favor of the recommendations. Certain reasons given by these Local Associations, both in favor of and against the recommendations, were embodied in the report, and the whole matter was referred to a Special Committee of the Board which is to be appointed to take up the question of a general remodeling of the Constitution of the Society. Undoubtedly, this Committee will ascertain the views of the membership of the Society as a whole on this and on other changes which have been proposed in the present Constitution.

**International Engineering Congress, 1915**

A circular, entitled "Tour de Luxe to the International Engineering Congress, 1915, and meetings of the American Society of Civil Engineers, American Institute of Mining Engineers, American Society of Mechanical Engineers, and American Institute of Electrical Engineers", has been issued, signed by A. E. Vaughan, and advertising a special tour. Notice is hereby given that this circular has been issued without the authority of the Joint Transportation Committee representing the Societies interested in the International Engineering Congress and in the other meetings to be held in San Francisco in September, 1915, although its form is such that it might easily be mistaken for an official communication.

## ANNOUNCEMENTS

**The House of the Society is open from 9 A. M. to 10 P. M., every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.**

### FUTURE MEETINGS

**June 2d, 1915.—8.30 P. M.**—This will be a regular business meeting. A paper by W. L. Du Moulin, Assoc. M. Am. Soc. C. E., entitled "The Pumping Plant of the Morenci Water Company", will be presented for discussion.

This paper was printed in *Proceedings* for April, 1915.

**September 1st, 1915.—8.30 P. M.**—A regular business meeting will be held, and two papers will be presented for discussion, as follows: "The Twelfth Street Trafficway Viaduct, Kansas City, Missouri", by E. E. Howard, M. Am. Soc. C. E.; and "Pearl Harbor Dry Dock", by H. R. Stanford, M. Am. Soc. C. E.

These papers are printed in this number of *Proceedings*.

### ANNUAL CONVENTION

The Annual Convention of the Society will be held in San Francisco, Cal., September 16th, 17th, and 18th, 1915, being the Thursday, Friday, and Saturday immediately preceding the International Engineering Congress, which is to be held during the week beginning September 20th.

Three of the other National Engineering Societies, under whose auspices the International Engineering Congress is to be held, will also hold meetings in San Francisco at about that time.

Arrangements have been made for a special train, and possibly more than one train, to accommodate the members of all these Societies who wish to attend their own meeting as well as the Congress.

A general circular containing information as to transportation, hotel rates, etc., has been issued, and later a programme more in detail will be sent out.

### SEARCHES IN THE LIBRARY

In January, 1902, the Secretary was authorized to make searches in the Library, upon request, and to charge therefor the actual cost to the Society for the extra work required. Since that time many searches have been made, and bibliographies and other information on special subjects furnished.

The resulting satisfaction, to the members who have made use of the resources of the Society in this manner, has been expressed fre-

quently, and leaves little doubt that if it were generally known to the membership that such work would be undertaken, many would avail themselves of it.

The cost is trifling compared with the value of the time of an engineer who looks up such matters himself, and the work can be performed quite as well, and much more quickly, by persons familiar with the Library.

In asking that such work be undertaken, members should specify clearly the subject to be covered, and whether references to general books only are desired, or whether a complete bibliography, involving search through periodical literature, is desired.

In making a search it sometimes happens that references are found which are not readily accessible to the person for whom the search is made. In that case the material may be reproduced by photography, and this can be done for members at the cost of the work to the Society, which is small. This method is particularly useful when there are drawings or figures in the text, which would be very expensive to reproduce by hand.

#### PAPERS AND DISCUSSIONS

Members and others who take part in the oral discussions of the papers presented are urged to revise their remarks promptly. Written communications from those who cannot attend the meetings should be sent in at the earliest possible date after the issue of a paper in *Proceedings*.

All papers accepted by the Publication Committee are classified by the Committee with respect to their availability for discussion at meetings.

Papers which, from their general nature, appear to be of a character suitable for oral discussion, will be published as heretofore in *Proceedings*, and set down for presentation to a future meeting of the Society, and on these, oral discussions, as well as written communications, will be solicited.

All papers which do not come under this heading, that is to say, those which from their mathematical or technical nature, in the opinion of the Committee are not adapted to oral discussion, will not be scheduled for presentation to any meeting. Such papers will be published in *Proceedings* in the same manner as those which are to be presented at meetings, but written discussions only will be requested for subsequent publication in *Proceedings* and with the paper in the volumes of *Transactions*.

The Board of Direction has adopted rules for the preparation and presentation of papers, which will be found on page 429 of the August, 1913, *Proceedings*.

**LOCAL ASSOCIATIONS OF MEMBERS  
OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS**

**San Francisco Association**

The San Francisco Association of Members of the American Society of Civil Engineers holds regular bi-monthly meetings, with banquet, and weekly informal luncheons. The former are held at 6 P. M., at the Palace Hotel, on the third Friday of February, April, June, August, October, and December, the last being the Annual Meeting of the Association.

Informal luncheons are held at 12.15 P. M., every Wednesday, and the place of meeting may be ascertained by communicating with the Secretary of the Association, E. T. Thurston, Jr., 713 Mechanics' Institute, 57 Post Street.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in San Francisco, and any such member will be gladly welcomed as a guest.

(Abstract of Minutes of Meetings)

**February 19th, 1915.**—The meeting was called to order at the Palace Hotel; President Hunt in the chair; E. T. Thurston, Jr., Secretary; and present, also, 71 members and guests.

Mr. J. C. Morrell, an architect representing the Government of Sydney, Australia, was the guest of the Association, and addressed the meeting briefly on architectural and engineering conditions in Australia.

President Hunt announced the death, on January 6th, 1915, of H. H. Fitting, Assoc. M. Am. Soc. C. E., and Mr. H. L. Haehl read a memorial of Mr. Fitting prepared by a Committee of the Association.

A paper by Mr. A. H. Markwart entitled "Building the Exposition", was read by Mr. J. D. Galloway, in Mr. Markwart's absence, and was illustrated with stereopticon views.

Adjourned.

**April 16th, 1915.**—The meeting was called to order at the Palace Hotel; Vice-President Haehl in the chair; E. T. Thurston, Jr., Secretary; and present, also, 54 members and guests.

The Board of Directors reported the results of the postal card inquiry as to the wishes of members regarding changes in the character of the meetings. The suggestions received were generally discussed by those present.

The Chairman for the Committee appointed to provide entertainment for visiting members during the Annual Convention, reported progress.

The following resolution was referred to the Board of Directors:

*"Resolved.*—The Secretary, as a part of his duties, is hereby required to endeavor to bring together employers in need of engineering help and engineers requiring employment; the manner of doing this being left to the discretion of the Secretary; and also that the Secretary be allowed an amount per month to help cover clerical expenses in connection with this matter, said amount to be decided by the

Board of Directors, and to be suited to the amount of work the Board may deem it advisable to undertake."

A report relative to the proportion of Association members to Society members within 100 miles of San Francisco, was made by the Secretary, and showed that for less than 50 miles the percentages of Members, Associate Members, Juniors, and Associates, respectively, were 71, 49, 27, and 60, and for more than 50 miles, they were 13, 8, 0, and 0, respectively.

A paper by Mr. H. H. Hall, entitled "The Water Supply for Klondike Hydraulic Mines", was presented by the author who illustrated his remarks with many stereopticon views of interior Alaska and of construction details and methods. A general discussion of the paper followed.

Adjourned.

#### **Colorado Association**

The meetings of the Colorado Association of Members of the American Society of Civil Engineers (Denver, Colo.) are held on the second Saturday of each month, except July and August. The hour and place of meeting are not fixed, but this information will be furnished on application to the Secretary, Roger W. Toll, 700 Tramway Building, Denver, Colo. The meetings are usually preceded by an informal dinner. Members of the American Society of Civil Engineers will be welcomed at these meetings.

Weekly luncheons are held on Wednesdays, at 12.30 p. m., at the Albany Hotel.

Visiting members are urged to attend the meetings and luncheons.

#### **(Abstract of Minutes of Meeting)**

**April 10th, 1915.**—The meeting was called to order at the Albany Hotel; President Vincent in the chair; Roger W. Toll, Secretary; and present, also, 11 members and guests.

The minutes of the meeting of March 13th, 1915, were read and approved.

A letter from Mr. Richard L. Humphrey, President of the Philadelphia Association, regarding the recommendations of the Conference of Presidents of the Local Associations, was read, but no definite action was taken.

A letter from the Colorado Scientific Society offering the Association the use of its auditorium in the new State Museum Building was read.

On motion, duly seconded, the Chair appointed Messrs. W. W. Curtis, Chairman, W. A. Bartlett, and E. C. Van Diest, a committee to report on plans for the reception of Members of the Society passing through Colorado Springs on their way to attend the International Engineering Congress in San Francisco.

Mr. Charles V. Eades addressed the meeting on the subject "Water-Proofing and Insulation". A vote of thanks was tendered Mr. Eades for his paper.

Adjourned.



During the afternoon of April 10th, 1915, and preceding the meeting, a party consisting of members of the Association and their friends visited the Colfax-Lorimer Viaduct now in course of construction. The party was in charge of Mr. H. S. Crocker, Consulting Engineer, and the Assistant Engineers.

#### **Atlanta Association**

The Atlanta Association of Members of the American Society of Civil Engineers was organized on March 14th, 1912. The Association holds its meetings at the University Club, Atlanta, Ga.

At the meeting of the Association on January 9th, 1915, the following officers were elected for the ensuing year: President, Park A. Dallis; First Vice-President, B. M. Hall; Second Vice-President, P. H. Norcross; Secretary-Treasurer, T. P. Branch.

#### **Baltimore Association**

On May 6th, 1914, the Baltimore Association of Members of the American Society of Civil Engineers was organized, a Constitution adopted, and the following officers were elected: J. E. Greiner, President; Francis Lee Stuart, First Vice-President; L. H. Beach, Second Vice-President; Harry D. Williar, Jr., Secretary-Treasurer; and Messrs. H. D. Bush, B. T. Fendall, B. P. Harrison, Calvin W. Hendrick, Oscar F. Lackey, M. A. Long, and A. A. Thompson, Directors.

At its meeting of September 2d, 1914, the Board of Direction considered and approved the proposed Constitution of the Baltimore Association of Members of the American Society of Civil Engineers.

#### **Cleveland Association**

The proposed Constitution of the Cleveland Association of Members of the American Society of Civil Engineers was considered and approved by the Board of Direction of the Society on January 6th, 1915.

The following officers have been elected: President, Willard Beahan; Vice-President, Robert Hoffmann; Secretary-Treasurer, George H. Tinker.

#### **Louisiana Association**

At the meeting of the Louisiana Association of Members of the American Society of Civil Engineers (New Orleans, La.), on April 14th, 1915, the following officers were elected for the ensuing year: J. F. Coleman, President; W. B. Gregory and A. M. Shaw, Vice-Presidents; Ole K. Olsen, Treasurer; and E. H. Coleman, Secretary.

#### **Northwestern Association**

The proposed Constitution of the Northwestern Association of Members of the American Society of Civil Engineers (St. Paul and Minneapolis, Minn.) was considered and approved by the Board of Direction of the Society on November 4th, 1914. F. W. Cappelen is President and R. D. Thomas, Secretary.

#### **Philadelphia Association**

The meetings of the Association are held at the Engineers' Club of Philadelphia, 1317 Spruce Street.

## (Abstract of Minutes of Meeting)

**April 27th, 1915.**—The meeting was called to order at the Engineers' Club of Philadelphia; President Richard L. Humphrey in the chair; W. L. Stevenson, Secretary; and present, also, about 50 members.

A resolution relative to the appointment of a committee to draft suitable minutes on the death of Mr. William Hunter, was submitted by the Board of Direction, and, on motion, duly seconded, the President was authorized to appoint such a committee.

Announcement was made of the election by the Board of Direction, of Mr. Edgar Marburg, as Vice-President, to fill the unexpired term of Mr. William Hunter, deceased, and of Mr. H. H. Quimby to fill Mr. Marburg's unexpired term. The appointment of the Nominating Committee for officers for 1916, was also announced.

A resolution relative to the affiliation of the Association with the Engineers' Club of Philadelphia, subject to the approval of the Board of Direction of the Society, was submitted by the Board of Direction, and on motion, duly seconded, was approved by the meeting.

Arthur P. Davis, M. Am. Soc. C. E., Director of the U. S. Reclamation Service, and one of three engineers sent by the American Red Cross, in 1914, to China, delivered an illustrated address on "The Flood Problem in China".

On motion, duly seconded, President Humphrey was elected as the Association's representative on the governing body of the Engineers' Club of Philadelphia, subject to the approval, by the Board of Direction of the Society, of the affiliation of the Association with the Engineers' Club.

Letter-ballots were canvassed on the proposed Amendment to the Constitution, providing that the three latest living Past-Presidents who are members of the Association, shall be members of its Board of Direction, and the Amendment was carried unanimously.

As a result of this Amendment, and owing to the death of Mr. William Hunter, the Board of Direction is now as follows: President, Richard L. Humphrey; Vice-Presidents, F. Herbert Snow and Edgar Marburg; Directors, John Sterling Deans, J. W. Ledoux, H. H. Quimby, and H. S. Smith; Past-President, George S. Webster; Treasurer, S. M. Swaab; and Secretary, W. L. Stevenson.

Adjourned.

**Portland, Ore., Association**

At the meeting of the Association on October 21st, 1914, the following officers were elected for the ensuing year: President, George C. Mason; First Vice-President, W. S. Turner; Second Vice-President, John T. Whistler; Treasurer, G. B. Hegardt; and Secretary, Charles J. McGonigle.

**St. Louis Association**

The proposed Constitution of the St. Louis Association of Members of the American Society of Civil Engineers was considered and approved by the Board of Direction of the Society on October 7th, 1914.

The following officers have been elected: President, J. A. Ockerson; First Vice-President, Edward E. Wall; Second Vice-President, F. J. Jonah; Secretary-Treasurer, Gurdon G. Black. The meetings of the Association are held at the Engineers' Club Auditorium.



**Seattle Association**

The Seattle Association of Members of the American Society of Civil Engineers was organized on June 30th, 1913. At its meeting of January 25th, 1915, the following officers were elected for the ensuing year: President, R. H. Ober; Vice-President, A. S. Downey; and Secretary-Treasurer, Carl H. Reeves.

(Abstract of Minutes of Meetings)

**March 29th, 1915.**—The meeting was called to order at 12.15 P. M., at the College Club; President R. H. Ober in the chair; Carl H. Reeves, Secretary; and present, also, 27 members and guests.

The minutes of the meeting of February 22d, 1915, were read and approved.

Mr. H. F. Tucker addressed the meeting relative to the efforts of the Washington Association of Engineers to unite all practicing engineers on an ethical basis both as to fees and general business practice.

An invitation from the Engineering Open House Committee of the University of Washington to attend an Open House on April 15th, 1915, was read and accepted.

Letters and reports from the Local Associations of Cleveland, Portland, Ore., and Southern California stating their action *in re* the report of the Conference of Presidents of Local Associations held at the Society House on January 19th, 1915, were read.

Letters from Messrs. Daniel Bontecou and C. F. Loweth, relative to Engineering Legislation were read.

A letter and a copy of the Pure Commodities Act, from Dr. H. G. Byers of the University of Washington, were presented, and referred to the Committee on Legislation.

Messrs. M. O. Sylliaasen and B. D. Dean addressed the meeting briefly.

The following Committees were continued: The Committee on Amendments to the Constitution of the Parent Society, consisting of Messrs. S. H. Hedges, Joseph Jacobs, Robert Howes, A. H. Fuller, and John L. Hall; the Committee on Legislation, consisting of Messrs. A. S. Downey, A. H. Fuller, A. H. Dimock, C. E. Fowler, Joseph Jacobs, A. O. Powell, and H. L. Gray; and the Committee on Conference, consisting of Messrs. Robert Howes, John L. Hall, and A. H. Fuller.

Mr. C. C. More described the tests which are to be made on the new warehouse of the Port Commission.

Adjourned.

**April 26th, 1915.**—The meeting was called to order at 12.15 P. M., at the College Club; Past-President Ernest B. Hussey in the chair; Carl H. Reeves, Secretary; and present, also, 23 members and guests.

The minutes of the meeting of March 29th, 1915, were read and approved.

The resignation of Mr. F. S. Burroughs was accepted.

The Chairman of the Conference Committee reported progress *in re* the work of the Joint Committee handling the preliminary work of the Amalgamated Technical Societies of the city.

Messrs. Henry Gray and Bertram D. Dean addressed the meeting briefly.

Adjourned.

#### **Southern California Association**

The Southern California Association of Members of the American Society of Civil Engineers (Los Angeles, Cal.) holds regular bi-monthly meetings, with banquet, on the second Wednesday of February, April, June, August, October, and December, the last being the Annual Meeting of the Association.

Informal luncheons are held at 12.15 P. M. every Wednesday, and the place of meeting may be ascertained from the Secretary of the Association, W. K. Barnard, 515 Central Building, Los Angeles, Cal.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in Los Angeles, and any such member will be gladly welcomed as a guest at any of the meetings or luncheons.

#### **Spokane Association**

The proposed Constitution of the Spokane Association of Members of the American Society of Civil Engineers was considered and approved by the Board of Direction of the Society on March 4th, 1914. Ulysses B. Hough is President.

#### **Texas Association**

The proposed Constitution of the Texas Association of Members of the American Society of Civil Engineers was considered and approved by the Board of Direction of the Society on December 31st, 1913. The headquarters of the Association is Dallas, Tex. John B. Hawley is President.

### **MINUTES OF MEETINGS OF SPECIAL COMMITTEES TO REPORT UPON ENGINEERING SUBJECTS**

#### **Special Committee on Materials for Road Construction**

**April 10th, 1915.**—The meeting was held at the House of the Society. Present, W. W. Crosby (Chairman), H. K. Bishop, A. W. Dean, Nelson P. Lewis, Charles J. Tilden, George W. Tillson, and A. H. Blanchard (Secretary).

Mr. Dean presented a progress report of the Sub-committee on New Forms.

The Chairman presented an outline of the work to be accomplished through the medium of new forms and tests pertaining to non-bituminous road materials.

A communication, dated March 6th, 1915, from the Board of Direction relative to a letter from E. W. Stern, M. Am. Soc. C. E., dated January 28th, 1915, a copy of which was enclosed, was presented for consideration, and a tentative report to the Board of Direction was adopted. The Secretary was instructed to forward this report and state that Mr. Stern's letter had been considered carefully at a

meeting at which all members of the Special Committee had been present, and that the report had been adopted unanimously.

The Secretary presented a communication from Mr. George W. Henderson relative to the Hendersonian pavement. The communication was placed on file.

It was decided that the next meeting of the Committee be held at the House of the Society on May 24th, 1915.

#### **Special Committee on Valuation of Public Utilities**

**April 8th, 9th, and 10th, 1915.**—The meetings were held at the House of the Society. Present, F. P. Stearns (Chairman), Charles S. Churchill, William G. Raymond, Henry E. Riggs, Jonathan P. Snow, William J. Wilgus, and Leonard Metcalf (Secretary).

The work done by the members of the Committee was reviewed, and tentative decisions were reached on matters raised in correspondence between the members of the Committee in the interval of time since the last meeting.

The Glossary of Terms was reconsidered in detail and completed, subject to such additions or changes as may hereafter prove necessary.

The Chapters on Property to be Included in Valuation, Original Cost to Date, and Development Expense, were considered in detail and carefully revised or discussed with a view to indicating further revision to be made.

The proposed outlines for certain other chapters were also discussed.

The Committee remained in session continuously for a three days' period, and held one long evening session.

Arrangements were made for future progress, and it was agreed that the next meeting should be held on or about July 6th, 1915, in Boston or vicinity.

#### **Special Committee to Investigate Conditions of Employment of, and Compensation of, Engineers**

**May 5th, 1915.**—The meeting was held at the House of the Society. Present, Nelson P. Lewis (Chairman), S. L. F. Deyo, C. F. Loweth, and George W. Tillson.

Mr. Tillson was elected Secretary *pro tem*.

Mr. Loweth reported that the Board of Direction had allowed the sum of \$400 for the expenses of the Committee for 1915.

Mr. Loweth, who at the last meeting of the Committee was requested to formulate a plan for securing information from railway and other corporations concerning the compensation paid to their engineers, reported that he had started with his own company, The Chicago, Milwaukee and St. Paul Railroad, but at once found himself confronted with serious difficulties in attempting to gather information of this kind; he believed that officers of other companies would find the same embarrassment, and that it was unlikely that the Committee would be able to secure information of value from such sources.

The Chairman submitted correspondence with the heads of a number of technical schools to whom he had written to see whether information of the kind the Committee desires was available with

respect to their graduates and former students. The replies indicated that few, if any, of the schools have accurate information of this kind, although they expressed their willingness to assist the Committee in any way that they could.

It was voted that inquiries similar to those already sent out be addressed to men who had become members of the Society since the last inquiry blank was sent out. The Chairman was authorized to try to secure information from such sources as might be available with respect to the salaries or professional incomes of those in other professions, more especially those of the law and medicine.

It was voted that inquiry circulars be addressed to such members of the local engineering societies appearing in the list of those which have extended their privileges to members of the American Society of Civil Engineers who are not also members of this Society.

After considerable discussion as to the necessity of another meeting in the immediate future, the Chairman and Messrs. Deyo and Tillson were appointed a sub-committee to take whatever steps might be necessary to further the work of the Committee, including the employment of such assistance as might be found necessary.

#### **PRIVILEGES OF ENGINEERING SOCIETIES EXTENDED TO MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS**

Members of the American Society of Civil Engineers will be welcomed by the following Engineering Societies, both to the use of their Reading Rooms, and at all meetings:

**American Institute of Mining Engineers**, 29 West Thirty-ninth Street, New York City.

**American Society of Mechanical Engineers**, 29 West Thirty-ninth Street, New York City.

**Architekten-Verein zu Berlin**, Wilhelmstrasse 92, Berlin W. 66, Germany.

**Associação dos Engenheiros Cívis Portuguezes**, Lisbon, Portugal.

**Australasian Institute of Mining Engineers**, Melbourne, Victoria, Australia.

**Boston Society of Civil Engineers**, 715 Tremont Temple, Boston, Mass.

**Brooklyn Engineers' Club**, 117 Remsen Street, Brooklyn, N. Y.

**Canadian Society of Civil Engineers**, 176 Mansfield Street, Montreal, Que., Canada.

**Civil Engineers' Society of St. Paul**, St. Paul, Minn.

**Cleveland Engineering Society**, Chamber of Commerce Building, Cleveland, Ohio.

**Cleveland Institute of Engineers**, Middlesbrough, England.

**Dansk Ingeniorforening**, Amaliegade 38, Copenhagen, Denmark.

- Detroit Engineering Society**, 46 Grand River Avenue, West, Detroit, Mich.
- Engineers and Architects Club of Louisville**, 1412 Starks Building, Louisville, Ky.
- Engineers' Club of Baltimore**, Baltimore, Md.
- Engineers' Club of Minneapolis**, 17 South Sixth Street, Minneapolis, Minn.
- Engineers' Club of Philadelphia**, 1317 Spruce Street, Philadelphia, Pa.
- Engineers' Club of St. Louis**, 3817 Olive Street, St. Louis, Mo.
- Engineers' Club of Toronto**, 96 King Street, West, Toronto, Ont., Canada.
- Engineers' Society of Northeastern Pennsylvania**, 415 Washington Avenue, Scranton, Pa.
- Engineers' Society of Pennsylvania**, 31 South Front Street, Harrisburg, Pa.
- Engineers' Society of Western Pennsylvania**, 2511 Oliver Building, Pittsburgh, Pa.
- Institute of Marine Engineers**, 58 Romford Road, Stratford, London, E., England.
- Institution of Engineers of the River Plate**, Calle 25 de Mayo 195, Buenos Aires, Argentine Republic.
- Institution of Naval Architects**, 5 Adelphi Terrace, London, W. C., England.
- Junior Institution of Engineers**, 39 Victoria Street, Westminster, S. W., London, England.
- Koninklijk Instituut van Ingenieurs**, The Hague, The Netherlands.
- Louisiana Engineering Society**, State Museum Building, Chartres and St. Ann Streets, New Orleans, La.
- Memphis Engineers' Club**, Memphis, Tenn.
- Midland Institute of Mining, Civil and Mechanical Engineers**, Sheffield, England.
- Montana Society of Engineers**, Butte, Mont.
- North of England Institute of Mining and Mechanical Engineers**, Newcastle-upon-Tyne, England.
- Oesterreichischer Ingenieur- und Architekten-Verein**, Eschenbachgasse 9, Vienna, Austria.
- Oregon Society of Civil Engineers**, Portland, Ore.
- Pacific Northwest Society of Engineers**, 312 Central Building, Seattle, Wash.
- Rochester Engineering Society**, Rochester, N. Y.
- Sachsischer Ingenieur- und Architekten-Verein**, Dresden, Germany.
- Sociedad Colombiana de Ingenieros**, Bogota, Colombia.
- Sociedad de Ingenieros del Peru**, Lima, Peru.

**Societe des Ingenieurs Civils de France**, 19 rue Blanche, Paris, France.

**Society of Engineers**, 17 Victoria Street, Westminster, S. W., London, England.

**Svenska Teknologforeningen**, Brunkebergstorg 18, Stockholm, Sweden.

**Tekniske Forening**, Vestre Boulevard 18-1, Copenhagen, Denmark.

**Western Society of Engineers**, 1737 Monadnock Block, Chicago, Ill.



## ACCESSIONS TO THE LIBRARY

(From April 4th to May 3d, 1915)

## DONATIONS\*

## TUNNELING:

Short and Long Tunnels of Small and Large Section Driven Through Hard and Soft Materials. By Eugene Lauchli. Cloth,  $9\frac{1}{2} \times 6\frac{1}{2}$  in., illus., 9 + 238 pp. New York and London, McGraw-Hill Book Company, Inc., 1915. \$3.00.

This treatise on tunneling was prepared, it is stated, to supply practicing engineers and contractors with such information as is necessary to them in tunnel work, and to present to students the underlying principles necessary to the solution of problems to be met in driving tunnels for various purposes. Such subjects as drilling, machinery and equipment, compressor and ventilating plants, explosives and their use, etc., and detailed descriptions of the driving of individual tunnels, have been omitted or only briefly described, it is said, because of the necessity to limit the size of the book; but the subjects discussed or theories developed have been illustrated by examples and figures taken from actual practice. The author states that the book is the result of personal observations and studies, together with data collected from reliable sources, and although some of the chapters have already appeared in technical papers, the text has been entirely rewritten to accord with present-day practice. Cost data for various tunnels constructed in the United States are included in the descriptions of such tunnels. In the case of tunnels driven in foreign countries, however, such data are omitted, owing, it is said, to the impossibility of comparison because of the differences in labor, wages, etc., in this and foreign countries. The Chapter headings are: Introduction; Importance of Geological Surveys in Connection with Tunnel Driving; Headings and Tunnels of Small Cross-Section, Driving Methods; Hauling Methods; Tunnels of Medium Cross-Section; Railroad Tunnels of Moderate Length; Drilling Machinery Used in Connection with Tunnel Work; Long and Deeply Overlaid Tunnels; Method of Handling and Removing Excavated Materials; Tunnel Timbering; Lining Deep Tunnels; Determination of the Rock Temperature in Deeply Overlaid Tunnels; Vitiation of the Atmosphere of Long Tunnels; Ventilation During Construction of Long and Deep Tunnels; Tunnels Driven Through Soft Materials; Pressure Acting on Tunnels Driven Through Soft and Cohesionless Materials; Siphon Tunnels; Tunnels Driven with Compressed Air; Miscellaneous Tunnels; Index.

## RAILROAD FIELD MANUAL FOR CIVIL ENGINEERS.

By William G. Raymond, M. Am. Soc. C. E. Morocco,  $7\frac{1}{2} \times 4\frac{1}{2}$  in., illus., 7 + 386 pp. New York, John Wiley & Sons, Inc.; London, Chapman & Hall, Limited, 1915. \$3.00.

As stated in the title, this Manual is intended principally for use in the field, and, besides tables, is said to contain sufficient explanatory matter relating to common field problems to refresh the memories of engineers who have not had much experience in railroad work, as well as some features not found in similar volumes. It differs from the usual railroad field manual in that the author has divided the degree decimally instead of sexagesimally and has based his tables on that method. He hopes that the plan will appeal to railroad engineers because the use of this new method will, he states, save time and lessen the likelihood of error in computation. Instruments to be used with this method should be graduated to read to hundredths of degrees directly or to 0.6 of a minute. Five-place tables have been adopted, it is said, as representing as high a degree of precision as is warranted by field work, and the author advises engineers to read the explanatory text before using the logarithmic tables. The subject-matter relating to spirals and spiral tables is based, it is stated, on the American Railway Engineering Association's ten-chord spiral. The Manual it is said, can be used on the sexagesimal division of the degree by engineers who do not care to have their instruments changed or to adopt the decimal division for their final records, but the author hopes that the new method will be given a trial and prove a real contribution to the Engineering Profession. The Contents are: Simple Compound and Vertical Curves; The Spiral; Logarithms and Trigonometric Functions; Location Theories and Tables; Estimating and Construction Tables; Turnouts and Crossovers; Azimuth, Latitude, and Time; Tables for Metric Curves; Miscellaneous Tables; Adjustment of Instruments; Sexagesimal Trigonometric Functions.

## WHO BUILT THE PANAMA CANAL?

By W. Leon Pepperman. Cloth,  $8\frac{1}{2} \times 5\frac{3}{4}$  in., illus., 14 + 419 pp. New York, E. P. Dutton & Company, 1915. \$2.00.

The author of this book was Chief of the Office of Administration under the Second Isthmian Canal Commission, and as such had charge of all the details of purchase and

\* Unless otherwise specified, books in this list have been donated by the publishers.

delivery of materials and supplies, contracts, fiscal affairs, correspondence, engineering reports and plans, etc., for that Commission. After a brief review of what had been accomplished on the Canal previous to 1905 when the Second Commission, known as the "Railroad Men's Commission", took charge, the author shows, it is stated, how the railroad men, under the direction of Theodore P. Shonts, laid the foundations on which the Panama Canal was built. He describes how they rebuilt the Panama Railroad; designed, purchased, and installed the machinery; perfected the plans for the disposal of the spoil; purchased and assembled the materials of construction; cleared Panama and Colon of disease and made them habitable by new water supplies, sewers, etc.; determined the character of labor to be employed; recruited that labor and brought it to the Isthmus and cared for it by building houses, hospitals, and schools, and establishing stores, banks, etc. The book, it is stated, gives the credit due them to the railroad men for what they did and how they did it. The text is illustrated by etchings from Mr. Joseph Pennell's series of Canal pictures, which add to its value historically. The Contents are: The French and the First Commission; Panama in 1905; The Railroad Men Take Charge; The Wallace Affair; Creating a Modern State in the Tropics; Solving the Labor Problem; The Reconstruction of the Panama Railroad; How the Lock Type of Canal Came to be Chosen; Panama in 1907; Human Mosquitoes; M. Bunau-Varilla and the Revolution in Panama; The Canal Itself and What it Means; Appendices: A, The First Trade Ship Through the Panama Canal; B, Farewell to Mr. Stevens; C, Some Letters About Mr. Shonts; D, Some Other Men Who Helped; E, President Roosevelt's Endorsement of the Railroad Men; F, "A Triumph for the Engineering Profession"; Index.

#### SEWAGE PURIFICATION AND DISPOSAL.

By G. Bertram Kershaw, M. Am. Soc. C. E. (Cambridge Public Health Series.) Cloth, 9 x 5½ in., illus., 10 + 340 pp. Cambridge, England, University Press, 1915. \$3.75. (Donated by the Author.)

As stated in the title, this volume is one of the Cambridge Public Health Series, which series is intended to present the latest scientific and practical information by experts on subjects dealing with the public health, in a useful and handy form and in a manner not too technical. In this volume on sewage purification and disposal, the author who has been the Engineer to the Royal Commission on Sewage Disposal for 16 years, has endeavored, it is stated, to present in concise detail the most recent knowledge relating to the various methods of sewage treatment, sewerage systems, the disposal of various kinds of sewage by different methods, costs, etc. A short bibliography of the subject discussed is given at the end of each chapter. The disposal of sewage by dilution has been omitted by the author, as it has been the subject of a previous volume of the series. The Contents are: Introduction; Conservancy Methods, Composition of Sewages, etc.; Sewage Systems, Variations in Sewage Flow, Storm-Water, etc.; Removal of Suspended Matter; Sludge Disposal; Land Treatment; Contact Beds; Percolating Filters; Sterilisation; Trade Wastes; Subject Index; Index of Authors; Index of Places Cited.

#### DIRECT-ACTING STEAM PUMPS.

By Frank F. Nickel. Cloth, 9½ x 6½ in., illus., 10 + 258 pp. New York and London, McGraw-Hill Book Company, Inc., 1915. \$3.00.

This type of pump has received scant attention, the preface states, from writers on pumping machinery. In recent years it has been replaced by the centrifugal pump, but there are still many conditions, particularly where the exhaust steam is usable, where it is said to be especially useful, and the author has considered it a duty to preserve, in this book, the history of the development of this class of pump, together with the results of his thirty years of experience in its use. The development of the pump, its efficiencies and losses under operation, its various types, and details of its design and operation, etc., are some of the interesting topics discussed in the text. The Appendix contains friction tables of Pennsylvania and California oils in pipes of various sizes. The Contents are: Development of the Direct-Acting Pump; Performance Factors; Classification and Types; Pump End Details; Steam End Details; Service Conditions vs. Various Types; Duty; Operation and Adjustment of Direct-Acting Pumps; Appendix; Index.

#### DONNÉES NUMÉRIQUES DE L'ELECTRICITÉ, MAGNÉTISME ET ELECTRO-CHIMIE.

Publiées sous le Patronage et avec l'Appui du Ministère du Commerce, de l'Industrie et des Postes et Télégraphes, du Comité des Forges de France (Paris), de la Société des Ingenieurs Civils (Paris), de la Société Internationale des Electriciens (Paris). Par P. Dutoit,



W. C. McC. Lewis, et A. Mahlke. Preface de M. Leblanc. (Tables Annuelles de Constantes et Données Numériques.) Extrait du Volume III, Année 1912. Boards,  $11\frac{1}{2} \times 8\frac{3}{4}$  in., 9 pp. + pp. 258-417. Paris, Gauthier-Villars et Cie.; Chicago, University of Chicago Press, 1914. 10 francs. (Donated by the American Commissioners of the International Committee on Annual Tables of Constants.)

As stated in the title, this book is Supplement B of Volume III of the Reports of the International Committee appointed in 1909, by the Seventh Congress of Applied Science, to report on various scientific and technical data. This Supplement contains tables of commercial constants, coefficients, etc., relating to electricity, magnetism, and electro-chemistry, and is intended to serve as a concise medium between the physicist who works out the problems by experiment and the engineer who applies them in his practice. The subject-matter has been compiled by specialists from the laboratories and periodicals of the world, and is published in this separate volume in order that it may be more helpful as an easy reference to those who use such data constantly. The preface states that the data relating to dielectrics, to disruptive potential, and to magnetism, together with certain constants concerned with the disruptive potential and the results of the work of M. Peek, are indispensable to those engaged in high-tension transmission by alternating currents. There are Tables of Contents in French, German, English, and Italian, as well as a short bibliography on electro-chemistry. The Contents are: Electricité, Magnétisme, par L. Mahlke: Conductibilités et Résistances Electriques; Forces Thermo-Electriques; Constantes Diélectriques; Potential Explosif, Rigidité Electrostatique, etc.; Ondes Electriques, Photo-Electricité, etc.; Ferromagnétisme; Hystérésis; Magnéto-Chimie; Rotation Magnétique, Phenomenes de Kerr, de Hall, etc. Electrochimie: I, Conductibilité Electrique des Electrolytes, par P. Dutoit; II, Forces Electromotrices, par W. C. McC. Lewis.

#### MATERIALS OF CONSTRUCTION:

Their Manufacture, Properties, and Uses. By Adelbert P. Mills, Assoc. M. Am. Soc. C. E. Cloth,  $9\frac{1}{2} \times 6\frac{1}{2}$  in., illus., 21 + 682 pp. New York, John Wiley & Sons, Inc.; London, Chapman & Hall, Limited, 1915. \$4.50.

The preparation of this volume, it is stated, was undertaken to meet the need for a general textbook covering the manufacture, properties, and uses of the more common materials of engineering construction in a thorough and concise manner. It is not intended, it is said, as an exhaustive treatise of the subject, but as a textbook and reference work of somewhat elementary character. In his treatment of the various classes of materials, the author has prefaced each material or class of materials by a discussion of its ordinary applications in engineering construction; this is followed by a study of its manufacture or natural occurrence, and the subject is concluded by a discussion of the physical and mechanical properties in their relations to its uses. Investigational data are presented in the form of curves or diagrams whenever tabulation can be avoided, and discussions of conflicting empirical data on points admitting of controversy are said to have been reduced to a minimum, the author's aim having been to present the subject-matter in a definite concrete form. Discussion of testing materials has also been omitted except in so far as methods of testing cannot be separated from discussions of the properties of materials as revealed by laboratory tests, as the author believes that the place for such discussion is in a laboratory manual. The Contents are: Part I, The Materials of Masonry Construction: Cementing Materials: Gypsum Plasters; Quiklime; Hydrated Lime; Hydraulic Lime and Grappler Cements; Puzzolan Cements; Slag Cements; Natural Cements; Portland Cement; Concrete; Non-Cementing Masonry Materials: Building Stones and Stone Masonry; Bricks and Other Clay Products. Part II, The Ferrous Metals: Pig Iron; Cast Iron; Malleable Cast Iron; Wrought Iron; Steel; The Special Alloy Steels. Part III, The Non-Ferrous Metals and Alloys and Timber: The Non-Ferrous Metals and Alloys; Timber; Index.

#### MOTOR TRANSPORTS IN WAR.

By Horace Wyatt. Cloth,  $7\frac{1}{2} \times 4\frac{1}{2}$  in., illus., 192 pp. London, New York and Toronto, Hodder and Stoughton, 1914. 50 cents. (Donated by George H. Doran Co.)

The author, in his capacity as Editor and Consulting Editor of *Motor Traction*, has studied, it is stated, the question of motor transport in military service from its small beginnings in British army manoeuvres many years ago to the present time. It has been, it is said, the motor car, the motor van, and the motor lorry which have rendered possible the rapid transport of troops, food, ammunition, and the rapid con-

veyance of wounded to the hospitals, in the present European war, and, in this book, the author, after a short review of the history of motors and tractors, has given in detail, it is stated, the steps taken by the various Governments to develop motor traction as applied to modern military necessities. The Contents are: Introduction; The Scope of the Motor Vehicle; The Importance of the Military Motor; Trials and Manœuvres; Experiences of Motors in Active Service; Motor Ambulance Work; The Transport of Ammunition and Artillery; Armoured Cars and Other Military Motors; The Provision of Military Motor Transport; A Comparison of National Conditions; British Subsidy Type Motors; Transport Motors of Continental Armies; Emergency Measures on the Outbreak of the War.

#### ENGINEERING ECONOMICS :

First Principles. By John Charles Lounsbury Fish, M. Am. Soc. C. E. Cloth,  $9\frac{1}{2} \times 6\frac{1}{4}$  in., illus., 12 + 217 pp. New York and London, McGraw-Hill Book Company, Inc., 1915. \$2.00.

The design of every engineering structure is judged finally, it is stated, from an economic standpoint, and it is essential, therefore, for the engineer and for all who hold responsible positions in connection with the choice, design, construction, and operation of structures to familiarize themselves with the principles which underlie economic judgment. The author's aim in this book has been to present a working knowledge of the first principles in the economics of structures, and it is also hoped that the book will facilitate the introduction of formal instruction in engineering economics in engineering schools. The subject-matter is divided into five parts, of which Part I is introductory. In Part II the meanings of the terms used and a working knowledge of interest and sinking funds are discussed preparatory to an understanding of Part III which relates to methods of solving problems of economic selection. In this part, the author has included fifteen numerical examples of economic comparison and selection worked out in detail. Part IV contains a bibliography, treatises, and tables relating to the subject and published references to cost data and methods of estimating, and Part V is devoted to tables of formulas and values. The Contents are: Part I, Introductory: The Problem of Economic Selection. Part II, Elements of the Problem of Economic Selection: Interest; Sinking Fund; First Cost; Salvage Value; Elements of Yearly Cost of Service; Estimating. Part III, Solution of the Problem of Economic Selection: Basis of Economic Comparison; Procedure for Economic Selection; Examples of Economic Selection. Part IV, Bibliography and Depreciation and Life Tables. Part V, Tables: Tables of Formulas; Tables of Value; Index.

#### CONTRACT AND ESTIMATE RECORD BOOK

For Steam and Hot Water Heating. Compiled by Clarence M. Lyman. Cloth,  $13 \times 9\frac{1}{2}$  in., 7 + 100 pp. New York, David Williams Company, 1914. \$2.00.

As described in the title, this book is intended for use by the steamfitter in making up his costs for estimates or contracts for steam or hot water heating. After rules for determining quantities of radiation, piping sizes, standard radiator tappings, list prices, discounts, and net prices, data relating to fittings, expansion tanks, chimney flues, properties of circles, etc., etc., comes the record book proper. It is divided into sections, such as boilers, radiators, valves, union elbows, etc., under each of which is given all the necessary supplies used under such section, divided into columns, those for the costs being double in order that the estimate may be carried in the first and the actual cost in the second, if desired. The contractor or estimator who uses these forms, carefully filling in all the details, will not, it is said, forget or duplicate supplies or figures, and will be sure that his estimate is correct.

#### ART DE L'INGÉNIEUR ET MÉTALLURGIE :

Résistances des Matériaux et Données Numériques Diverses: Publiées sous le Patronage et avec l'Appui du Ministère des Travaux Publics (Paris), du Comité des Forges de France (Paris), du Groupe Franco-Belge de l'Association Internationale pour l'Essai des Matériaux (Paris), de l'Iron and Steel Institute (Londres), de la Société des Ingénieurs Civils (Paris), de la Société Industrielle de l'Est (Nancy). Par S. L. Archbutt, G. Fieck et W. Hinrichsen, E. Nusbaumer, et A. Portevin. Preface de A. Mesnager. (Tables Annuelles de Constantes et Données Numériques.) Extrait du Volume III, Année 1912. Boards,  $11\frac{1}{4} \times 8\frac{3}{4}$  in., 8 pp. + pp. 510-600. Paris, Gauthier-Villars

et Cie.; Chicago, University of Chicago Press, 1914. 10 francs. (Donated by the American Commissioners of the International Committee on Annual Tables of Constants.)

This book is Supplement F of Volume III, issued by an International Committee appointed in 1909, by the Seventh Congress of Applied Science, to report on various scientific and technical data gathered from the laboratories and periodicals of various countries of the world. These data are compiled by specialists on the subjects and are published annually in order, it is stated, that the producer and consumer may keep up with present practice in their particular lines with little study. The subject-matter of this Supplement is limited to Engineering and Metallurgy and includes tables of coefficients, resistances, and various other data pertaining to building materials, textiles, tissues, paper, air and water, bending, friction, refractory materials, fuels, metals and their alloys, etc. At the end of the book is a Table of Contents and an Index in French, German, English, and Italian. The Contents are: Art de l'Ingenieur, par MM. G. Fleck et W. Hinrichsen: I, Constantes Mecaniques (Matériaux de Construction, Textiles et Tissus, Données Diverses); II, Constantes Thermiques (Produits Refractaires, Combustibles). Metallurgie, par MM. S. Archbutt, E. Nusbaumer, et A. Portevin: I, Données Techniques Diverses sur les Metaux et Alliages (Temperature Critique, Solubilité, Densité, Corrosion, etc.); II, Constantes Mecaniques (Essais de Traction, de Compression, de Flexion, de Dureté, etc.); Supplement.

#### THE ART OF ESTIMATING THE COST OF WORK

With Special Reference to Unstandardized Operations as in Jobbing Shops or Repair Work. By William B. Ferguson. Cloth, 8 x 5½ in., illus., 97 pp. New York, The Engineering Magazine Co., 1915. \$1.00.

The purpose of this book, is to aid in the standardization of estimating the cost of work, with particular attention to the cost of labor on jobbing work or repairs. The subject-matter is the result, it is stated, of the author's experience in preparing and checking estimates for all kinds of ship construction and repair work and the collection and classification of all kinds of actual cost data, embracing work in both Government and private plants and including costs of ordinary day work, piece work, and premium systems of pay. Each plant, it is stated, must collect its own data and must determine a standard estimate for each unit, whether material or labor cost. The author, in this book, then illustrates by examples, descriptions, and references to costs of repairs and alterations to vessels, how an estimator can compare all costs and estimates for new work or repair work with such a standard estimate, and how data can be collected gradually by the plant by which the best possible estimates can be made quickly and accurately for any item of work which may arise. A short bibliography on cost keeping and business organization is given in Appendix II. The Contents are: Introduction; The Art of Estimating; General Methods by Curves or Graphs; Practical Meaning of the Curves; New Construction Work; Repair Work; Classification of Variable Conditions; Cost Data on New Construction; Piece Work Prices; Unstandardized Work; Symbolizing Labor Operations; Needs for Good Estimates; Planning and Estimating by Operations; Preparation and Use of Curves; Estimating Overhead Expense; The Use and Danger of "Rough" Estimates; Developing an Estimating Section; Conclusion; Appendices.

Gifts have also been received from the following:

- |   |   |
|---|---|
| Alabama-Geol. Survey. 1 pam.                      | Atlantic Deeper Waterways Assoc. 1 vol.                             |
| Alabama-State Board of Health. 4 pam.             | Baltimore, Md.-Harbor Board. 1 pam.                                 |
| Alabama-State Mine Insp. 1 bound vol.             | Blossom, Francis. 1 pam.  |
| Alaska-Board of Road Commrs. 5 pam.               | Bombay, India-Public Works Dept. 1 pam.                             |
| Am. Gas & Elec. Co. 1 pam.                        | Boston, Mass.-Directors of the Port of Boston. 1 bound vol., 1 pam. |
| Am. Gas Inst. 2 bound vol.                        | Boston, Mass.-Finance Comm. 1 bound vol.                            |
| Am. Mathematical Soc. 1 pam.                      | Boston, Mass.-Transit Comm. 1 bound vol.                            |
| Am. Public Health Assoc. 2 pam.                   | Brooklyn League-Committee on Industrial Advancement. 1 bound vol.   |
| Am. Ry. Bridge and Bldg. Assoc. 1 vol.            | Bureau of Ry. Economics. 8 pam.                                     |
| Am. Red Cross-Board of Engrs. 1 pam.              | California, Univ. of. 1 pam.  |
| Am. Soc. of Agricultural Engrs. 1 vol.            | Canada-Dept. of Mines. 1 bound vol., 3 vol.                         |
| Am. Soc. of Heating and Ventilating Engrs. 1 pam. | Charleston, S. C.-Mayor. 1 bound vol.                               |
| Am. System of Reinforcing. 1 pam.                 | Chicago, Indiana & Southern R. R. Co. 1 pam.                        |
| Am. Telephone & Telegraph Co. 1 pam.              | Chosen, Japan-Ry. Bureau of the Govt.-Gen. 1 vol.                   |
| Arizona-Dept. of Weights and Measures. 2 pam.     | Cincinnati, Ohio-Eng. Dept. 48 maps.                                |
| Arizona-State Mine Insp. 1 pam.                   |   |
| Associated Metal Lath Mfrs. 1 bound vol.          |   |
| Assoc. of Dominion Land Surveyors. 2 pam.         |   |

- Cincinnati Northern R. R. Co. 1 pam.  
 Cleveland, Cincinnati, Chicago & St. Louis Ry. Co. 1 pam.  
 Colorado-Bureau of Mines. 1 bound vol.  
 Colorado-Public Utilities Comm. 1 vol.  
 Colorado-State Geol. Survey. 1 bound vol.  
 Colorado-State Highway Comm. 2 pam., 1 map.  
 Colorado School of Mines. 2 pam.  
 Colorado, Univ. of. 1 vol.  
 Columbus, Ohio-Div. of Water. 1 pam.  
 Congreso Científico, 4th. 1 vol.  
 Connecticut-State Board of Health. 2 bound vol.  
 Connecticut-State Park Comm. 1 bound vol.  
 Cresson, B. F. 1 pam.  
 Cumberland Valley R. R. Co. 1 pam.  
 Delaware-Secy. of State. 1 pam.  
 Delaware & Hudson Co. 1 pam.  
 Diesem, H. C. 1 vol.  
 Easton, Pa.-City Clerk. 1 pam.  
 Edinburgh, Scotland-City Chamberlain. 1 bound vol.  
 Engrs.' Club. 1 bound vol.  
 Engrs.' Club of St. Louis. 1 vol.  
 Erie R. R. Co. 1 pam.  
 Fess, S. D. 1 pam.  
 Florida-R. R. Comm. 1 vol.  
 Ford, F. L. 1 bound vol., 2 pam.  
 Fuel Eng. Co. 1 bound vol.  
 Germany-Kaiserliche Gen. Direktion der Eisenbahnen in Elsass-Lothringen. 1 vol.  
 Grand Rapids & Indiana Ry. Co. 1 pam.  
 Green Bay & Western R. R. Co. 1 pam.  
 Hunt & Co., Robert W. 1 pam.  
 Idaho-Public Utilities Comm. 1 vol.  
 Illinois-Miners' and Mechanics' Institutes. 2 pam.  
 Illinois-State Public Utilities Comm. 2 bound vol., 1 pam.  
 Illinois, Univ. of-Agricultural Exper. Station. 2 pam.  
 Indiana-Public Service Comm. 1 vol.  
 Indiana-State Board of Health. 1 bound vol.  
 Institution of Civ. Engrs. 1 bound vol.  
 Iowa State Coll. of Agriculture and the Mech. Arts. 1 pam.  
 Iowa State Univ. 2 pam.  
 Jenkins, Frederick W. 2 vol., 1 pam.  
 Kent, England-County Surv. 1 pam.  
 Kentucky-Dept. of Public Roads. 5 pam.  
 Koninklijk Instituut van Ingenieurs. 1 pam.  
 Lake Erie & Western R. R. Co. 1 pam.  
 Lake Shore & Michigan Southern Ry. Co. 1 pam.  
 Leland Stanford Junior Univ. 1 vol.  
 Louisiana State Univ. and Agricultural and Mech. Coll. 1 pam.  
 Maine-Secy. of State. 1 pam.  
 Maine Soc. of Civ. Engrs. 1 pam.  
 Maine, Univ. of. 1 vol.  
 Maryland-Executive Dept. 1 vol.  
 Maryland-Public Service Comm. 1 bound vol.  
 Massachusetts-Board of Harbor and Land Commrs. 1 vol.  
 Massachusetts-Bureau of Statistics. 1 pam.  
 Massachusetts-Homestead Comm. 2 pam.  
 Massachusetts Agricultural Coll. 2 pam.  
 Metcalf, Leonard. 1 bound vol., 4 vol.  
 Michigan-Secy. of State. 1 bound vol.  
 Michigan-State Highway Dept. 1 bound vol.  
 Michigan Central R. R. Co. 1 pam.  
 Midland Great Western Ry. of Ireland Co. 12 pam.  
 Min. and Metallurgical Soc. of America. 1 pam.  
 Minnesota-Efficiency and Economy Comm. 1 pam.  
 Minnesota-R. R. Warehouse Comm. 1 bound vol.  
 Minnesota-State Board of Health. 1 pam.  
 Minnesota School of Mines-Exper. Station. 1 pam.  
 Minnesota, Univ. of. 1 pam.  
 Mississippi-State Geol. Survey. 2 bound vol.  
 Mississippi Agri. and Mech. Coll. 2 pam.  
 Missouri-Bureau of Geology and Mines. 1 pam., 1 map.  
 Missouri-Secy. of State. 1 pam.  
 Missouri-State Board of Health. 2 bound vol., 1 pam.  
 Montana-State Board of Health. 1 pam.  
 Montana-State Grain Inspection Dept. 1 pam.  
 Montana, Univ. of. 1 vol.  
 National Fire Proofing Co. 5 pam.  
 National Tax Assoc. 1 pam.  
 Natural Ice Assoc. of America. 1 bound vol.  
 Nebraska-State Ry. Comm. 1 vol.  
 Nebraska, Univ. of. 1 pam.  
 Nevada-R. R. Comm. 1 vol.  
 New Bedford, Mass.-City Engr. 1 pam.  
 New Hampshire Coll. of Agriculture and Mech. Arts. 1 pam.  
 New Mexico, Univ. of. 1 pam.  
 New York City-Commr. of Public Works. 1 vol.  
 New York City-Dept. of Finance. 4 pam.  
 New York City-President, Borough of Manhattan. 1 bound vol.  
 New York State-Civ. Service Comm. 1 bound vol.  
 New York Central & Hudson River R. R. Co. 1 pam.  
 New York Public Library. 35 bound vol., 52 pam.  
 New York Telephone Co. 1 bound vol.  
 Newark, N. J.-City Plan Comm. 1 pam.  
 North Eastern Ry. Co. 13 pam.  
 Norwalk, Conn.-Second Taxing Dist. 1 pam.  
 O'Gorman, J. A. 19 pam.  
 Oregon-R. R. Comm. 1 vol.  
 Oregon-State Highway Engr. 1 bound vol.  
 Pennsylvania-Bureau of Standards. 3 pam.  
 Pennsylvania-Dept. of Agriculture. 1 bound vol.  
 Pennsylvania-Dept. of Health. 4 bound vol.  
 Pennsylvania-Dept. of Internal Affairs. 1 bound vol.  
 Pennsylvania-Senate. 1 pam.  
 Pennsylvania-State Highway Dept. 1 pam.  
 Pennsylvania-Topographical and Geol. Survey. 1 bound vol.  
 Pennsylvania-Valley Forge Park Comm. 2 pam.  
 Pennsylvania-Water Supply Comm. 1 bound vol.  
 Pennsylvania R. R. Co. 1 bound vol., 1 pam.  
 Pennsylvania State Coll.-Agricultural Exper. Station. 1 pam.  
 Philippine Islands-Bureau of Science. 1 pam.  
 Pittsburgh & Lake Erie R. R. Co. 1 pam.  
 Powelson, W. V. N. 1 pam.

- Queensland-Commr. for Rys. 1 pam.  
 Rhode Island-Board of Harbor Commrs. 3 pam.  
 Rhode Island-Commrs. of Inland Fisheries. 1 bound vol.  
 Rhode Island-State Board of Public Roads. 1 pam.  
 Richardson, Clifford. 1 pam.  
 Root, J. E. 1 bound vol.  
 Rose Polytechnic Inst. 1 vol.  
 Rutland R. R. Co. 1 pam.  
 Shanghai, China-Municipal Council. 1 bound vol.  
 Shaw, George Herbert. 1 pam.  
 Smithsonian Institution. 2 pam.  
 Soc. for the Promotion of Eng. Education. 1 bound vol.  
 South Dakota-State Insp. of Mines. 1 pam.  
 Southend Waterworks Co. 1 pam.  
 Solnoza, A. V. 3 pam., 1 chart.  
 State and Provincial Boards of Health of North America. 1 pam.  
 Stuart, Inglis. 1 bound vol.  
 Syracuse Univ. 1 vol.  
 Taunton, Mass.-Water Board. 1 pam.  
 Tennessee-State Geol. Survey. 1 pam.  
 Tennessee Univ. of-Agricultural Exper. Station. 7 pam.  
 Texas, Agricultural and Mech. Coll. of. 1 pam.  
 Texas, Univ. of. 1 vol., 4 pam.  
 Toledo & Ohio Central Ry. Co. 1 pam.  
 Toronto, Hamilton & Buffalo Ry. Co. 1 pam.  
 Tuttle, Arthur S. 1 pam.  
 Union of South Africa-Gen. Mgr. of Rys. and Harbours. 1 vol., 1 pam.  
 U. S.-Bureau of Foreign and Domestic Commerce. 1 bound vol.  
 U. S.-Bureau of Lighthouses. 2 pam.  
 U. S.-Bureau of Mines. 6 pam.  
 U. S.-Bureau of Standards. 2 pam.  
 U. S.-Bureau of the Census. 2 bound vol., 1 vol.  
 U. S.-Chf. of Engrs. 16 specif.  
 U. S.-Coast and Geodetic Survey. 2 pam.  
 U. S.-Corps of Engrs. 1 vol., 2 pam.  
 U. S.-Dept. of Agriculture. 133 pam.  
 U. S.-Dept. of Commerce. 1 pam.  
 U. S.-Dept. of the Interior. 2 bound vol., 4 pam.  
 U. S.-Forest Service. 3 pam.  
 U. S.-Gen. Land Office. 1 map.  
 U. S.-Geol. Survey. 7 vol., 27 pam.  
 U. S.-Interstate Commerce Comm. 9 pam.  
 U. S.-Lake Survey Office. 5 maps.  
 U. S.-National Museum. 1 vol., 1 pam.  
 U. S.-Panama Canal. 1 pam.  
 U. S.-Reclamation Service. 1 pam.  
 U. S.-Steamboat Inspection Service. 1 pam.  
 U. S.-Quartermaster-Gen. of the Army. 1 bound vol.  
 U. S.-Supt. of Documents. 2 pam.  
 U. S.-Weather Bureau. 23 pam.  
 Utah-State Mine Insp. 1 vol.  
 Vermont-Geol. Survey. 1 bound vol.  
 Vermont, Univ. of. 1 pam.  
 Virginia-Bureau of Labor and Industrial Statistics. 1 bound vol.  
 Virginia-Geol. Survey. 1 map.  
 Virginia-State Board of Health. 1 pam.  
 Virginia-State Highway Commr. 1 pam.  
 Washington-Board of Health. 1 pam.  
 Washington-State Forester. 1 pam.  
 Washington, Univ. of. 1 vol.  
 Western Canada Irrig. Assoc. 1 vol.  
 Woolson, Ira H. 2 pam.  
 Worcester, Mass.-Supt. of Sewers. 1 pam.  
 Wrightsville & Tennille R. R. Co. 7 pam.  
 Wyoming-Agricultural Exper. Station. 1 pam.  
 Wyoming-State Board of Health. 1 pam.  
 York, England-City Engr. 3 pam.

## BY PURCHASE

**National Association of Railway Commissioners.** Proceedings of the Twenty-Sixth Annual Convention. Held at Washington, D. C., February 17th-20th, 1914. New York, 1915.

**Electric Railway Handbook:** A Reference Book of Practice Data, Formulas and Tables for the Use of Operators, Engineers, and Students. By Albert S. Richey, Assisted by William C. Greenough. New York and London, 1915.

**Soil Fertility and Permanent Agriculture.** By Cyril G. Hopkins. New York, Boston, Chicago, and London, 1910.

**Municipal Chemistry:** A Series of Thirty Lectures by Experts on the Application of the Principles of Chemistry to the City, Delivered at the College of the City of New York, 1910. Edited by Charles Baskerville. New York and London, 1911.

**Handbook of Machine Shop Management.** By John H. Van Deventer. New York and London, 1915.

**Wiring of Finished Buildings:** A Practical Treatise, Dealing with the Commercial and the Technical Phases of the Subject, for the Central-Station Man, Electrical Contractor, and Wireman. By Terrell Croft. New York and London, 1915.



**General Agricultural Chemistry.** By Edwin B. Hart and William E. Tottingham. Madison, 1913.

**General Principles of the Method of Least Squares,** with Applications. By Dana P. Bartlett. Third Edition. Boston, 1915.

**Railroads:** Finance and Organization. By William Z. Ripley. New York, London, Bombay, Calcutta, and Madras, 1915.

**Valve Gears.** By Charles H. Fessenden. New York and London, 1915.

**Water Supplies:** Their Purification, Filtration, and Sterilization: A Handbook for the Use of Local and Municipal Authorities. By Samuel Rideal and Eric K. Rideal. New York, 1915.

**Civil Engineering Types and Devices:** A Classified and Illustrated Index of Plant, Construction, Machines, Materials, Means and Methods Adopted and in Use in Civil Engineering Works of Every Class. By T. W. Barber. New York, 1915.

**Constant-Voltage Transmission:** A Discussion of the Use of Synchronous Motors for Eliminating Variation in Voltage in Electric Power Systems. By Herbert Bristol Dwight. New York and London, 1915.

**The Design of Steam Boilers and Pressure Vessels.** By George B. Haven and George W. Swett. New York and London, 1915.

**Erection and Inspection of Iron and Steel Constructions;** Written for the Use of Architects, Engineers and Builders and for Civil Service Candidates for the Position of Inspector of Iron and Steel. By L. M. Bernfeld. New York, 1913.

**Structural Design of Warships.** By William Hovgaard. New York and London, 1915.

**Cape Cod and Its Canal.** By J. W. Miller. 1914.

**Beton-Kalender, 1915.** Taschenbuch für Beton und Eisenbetonbau, sowie die verwandten Fächer. Unter Mitwirkung hervorragender Fachmänner, herausgegeben von der Zeitschrift *Beton u. Eisen*. X Neubearbeiteter Jahrgang. 2 Vol. Berlin, 1914.

#### SUMMARY OF ACCESSIONS

(From April 4th to May 3d, 1915)

Donations (including 73 duplicates).....	722
By purchase.....	19
Total .....	741



## MEMBERSHIP

(From April 9th to May 6th, 1915)

## ADDITIONS

MEMBERS	Date of Membership.
COURTNEY, REGINALD SYDNEY. Mgr. with Jacobs & Davies, 30 Church St., New York City.....	April 7, 1915
DAVIS, FRANCIS HEWETTE. Works Mgr., Santa Cruz Portland Cement Co. and Standard Portland Cement Corporation, 300 Crocker Bldg., San Francisco, Cal....	April 7, 1915
KINSEY, EDMUND RAYMOND. Pres., Board of Public Service, 6321 Alabama Ave., St. Louis, Mo.....	Jan. 6, 1915
LACY, ROBERT. Engr. and Contr., 1630 Linden Ave., Baltimore, Md.....	April 7, 1915
LITTER, FERDINAND JOSEPH. Chf. Engr., Snare & Triest Co., 306 East 175th St., New York City.....	April 7, 1915
MOULTON, SETH AUGUSTINE. Cons. Engr. (The Moulton Eng. Corporation), 120 Exchange St., Portland, Me.	April 7, 1915
NORTON, GEORGE HARVEY. Deputy Engr. Commr., Dept. of Public Works, 533 Fargo Ave., Buffalo, N. Y....	April 7, 1915
SIMS, STUART. Civ. and Hydr. Engr., 114 East } Assoc. M. July 1, 1909	
Market St., Iowa City, Iowa..... } M. Jan. 6, 1915	

## ASSOCIATE MEMBERS

ACHER, ALBERT HILANDS. First Lieut., Corps of Engrs., U. S. A., Care, U. S. Engr. Office, Los Angeles, Cal..	April 7, 1915
BAILEY, PAUL. Engr., Whitehall Estates, Inc., } Jun. Jan. 7, 1913	
Tracy, Cal..... } Assoc. M. April 7, 1915	
BELL, JAMES C. Asst. Engr., Dept., State Engr. and Surv., 4 North Brandywine Ave., Schenectady, N. Y.....	April 7, 1915
BENHAM, CHARLES, JR. Asst. Engr., Rochester Lines, New York State Rys., 267 State St., Rochester, N. Y....	April 7, 1915
BLOMFIELD, HJALMAR LUTHER. Constr. Engr., Pennsylvania Salt Mfg. Co., Trenton, Mich.....	April 7, 1915
BOUDINOT, ALLEN ROY. City Engr.; Member, Board of Public Works, City Hall, Davenport, Iowa.....	April 7, 1915
BRAINERD, HAROLD AFFLECK. Asst. Engr., Am. Bridge Co., 30 Church St., New York } Jun. Nov. 30, 1909	
City (Res., 618 Maple St., Westfield, } Assoc. M. April 7, 1915	
N. J.).....	
BROWN, ELBERT CALVIN. Albay, Albay, Philippine Islands.	Jan. 6, 1915
BRUNEL, RICHARD. Asst. to Res. Engr. on Constr., Portland Bridge, 39 Cedar St., Portland, Me.....	April 7, 1915
BUDD, PERCY HIRAM. 3422 Glenwood Rd., Brooklyn, N. Y.	April 7, 1915
BURNEY, ROBERT LEE. Gen. Contr. (Walsh & Burney), 415 Conroy Bldg., San Antonio, Tex.....	April 7, 1915

ASSOCIATE MEMBERS (*Continued*)

	Date of Membership.	
CHASE, CLIFFORD EARL. Supt. and Engr., Okanogan Power & Irrig. Co., Brewster, Wash.....	April	7, 1915
COVEY, CHARLES HENRY. Asst. Supt., Fraser, Brace & Co., Room 826, Power Bldg., Montreal, Que., Canada....	April	7, 1915
CRANDALL, LYNN. Asst. Engr., U. S. Geological Survey, 421 Federal Bldg., Salt Lake } Jun. Dec. 6, 1910	Assoc. M.	April 7, 1915
City, Utah.....		
CURTIS, GEORGE DAVE. First Asst. to Chf. Drainage Engr., Board of Commrs., Everglades Drainage Dist., State of Florida, P. O. Box 200, Tallahassee, Fla.....	April	7, 1915
DAVENPORT, ROYAL WILLIAM. Asst. Engr., } Jun. Oct. 4, 1910	Assoc. M.	April 7, 1915
Land Classification Board, U. S. Geo- logical Survey, Washington, D. C.....		
DESMOND, THOMAS CHARLES. Asst. Engr., U. S. Realty & Impvt. Co., 17 Gramercy Park, New York City....	April	7, 1915
ELLIOTT, JOSEPH ALFRED. Supt. and Mgr., Wheatland Office, Wyoming Development Co., Wheatland, Wyo.....	April	7, 1915
FAITOUTE, FREDERIC BUTTERFIELD. Supt. with T. A. Gil- lespie, 50 Park Pl. (Res., 1770 Concourse), New York City.....	April	7, 1915
FARLEY, MARCUS MARTIN. Asst. Engr., Head- quarters Dept., Board of Water Supply, } Jun. Sept. 4, 1906	Assoc. M.	April 7, 1915
City of New York, 22d Floor, Municipal Bldg., New York City.....		
GAUSMANN, ROY WARNER. Section Engr., Board of Water Supply, New York City, Brown Station, N. Y.....	Mar.	2, 1915
GRIFFIN, JAMES BIRNEY. Chf. Engr., Abbot Kinney Co., 29 Windward Ave., Venice, Cal.....	April	7, 1915
HAW, ELMER PERKINS. Dist. Engr., Technical Section, Dept. of Public Works, Republic of Panama, Care, University Club, Ancon, Canal Zone, Panama.....	April	7, 1915
HEED, SAMUEL DARLINGTON. Asst. Engr. of Constr., New York Connecting R. R., 110 East 16th St., New York City.....	April	7, 1915
HIRSCH, JOHN GEORGE. Civ. Engr., Bates & } Jun. June 30, 1910	Assoc. M.	April 7, 1915
Rogers Constr. Co., Chicago, Ill., 276 Hanover St., Milwaukee, Wis.....		
HUNTINGTON, WHITNEY CLARK. Engr. with M. S. Ketchum; Asst. Prof. of Civ. Eng., Univ. of Colorado, 1003 Fifteenth St., Boulder, Colo.....	April	7, 1915
HUTCHINS, RALPH. Asst. Engr., Baltimore Sewerage Comm., 1533 Linden Ave. (Res., 5 West Preston St.), Baltimore, Md.....	April	7, 1915
JAMES, CLEVELAND ABBE. Res. Engr., L. V. R. R., Third National Bank, Buffalo, N. Y.....	April	7, 1915

ASSOCIATE MEMBERS (*Continued*)Date of  
Membership.

KELLY, WARREN WINFIELD. Care, Chf. Engr., A., T. & S. F. Ry., Los Angeles, Cal.....		April 7, 1915
KING, ARTHUR CASWELL. Supt.'s Asst., Springfield Water Dept. (Res., 34 Foster St.), Springfield, Mass.....	Jun. Assoc. M.	Sept. 4, 1906 April 7, 1915
KNIGHT, GERALD WILSON. Asst. Engr., R. Winthrop Pratt, 1272 Virginia Ave., Lakewood, Ohio.....		April 7, 1915
KOOP, LOUIS DIETRICH. Asst. Engr., Dept. of Bridges, 464 East 141st St., New York City.....		April 7, 1915
LEARNED, CLYDE EMERSON. Care, Mrs. Spears, R. F. D. No. 1, Massena, N. Y.....		April 7, 1915
LEET, CLIFFORD STONE. Land Agt., B. & L. E. R. R., 602 Frick Bldg., Pittsburgh, Pa.....		April 7, 1915
LOSH, ALBERT RICHARD. Asst. Engr., Office of State Engr., 1018 Houston St., Manhattan, Kans.....		April 7, 1915
NELSON, JABEZ CURRY. Prin. Asst. Engr., Ford, Bacon & Davis, 115 Broadway, Room 1610, New York City.....	Jun. Assoc. M.	Oct. 1, 1907 April 7, 1915
PORTER, RALPH WALDO. 1448 Coutant St., Cleveland, Ohio.		Dec. 2, 1914
PORZELIUS, ALBERT FREDRICK. Care, Portsmouth, Berkley & Suffolk Water Co., Suffolk, Va.....	Jun. Assoc. M.	Jan. 7, 1913 April 7, 1915
QUERBACH, EARL. Care, Am. Bridge Co., Ambbridge, Pa.....	Jun. Assoc. M.	Dec. 4, 1906 April 7, 1915
QUICK, RAY STEVENS. Draftsman, Div. of Surveys, Bureau of Eng., 3 Wellington Apartment, Sycamore St., Pittsburgh, Pa.....		April 7, 1915
RAY, FRANK OLIVER. Engr., The R. Hardesty Mfg. Co., 1811 Market St., Denver, Colo.....		April 7, 1915
SMITH, SHALER GORDON. Care, Cedar Valley Elec. Co., Charles City, Iowa.....	Jun. Assoc. M.	July 1, 1909 April 7, 1915
STEINMAN, DAVID BERNARD. Special Asst. Engr., New York Connecting R. R., 68 William St., New York City.....	Jun. Assoc. M.	Mar. 1, 1910 April 7, 1915
STINEMAN, NORMAN MERRITT. Bridge Designer, Eng. Dept., C., M. & St. P. Ry., 4923 Winthrop Ave., Chicago, Ill.		April 7, 1915
STURDY, NATHAN HENRY. Engr. with Trussed Concrete Steel Co., 426 Emerson Pl., Youngstown, Ohio.....		April 7, 1915
SWENSSON, OTTO JORDAN. Acting Asst. Engr., Bureau of Highways, Manhattan Borough, Municipal Bldg., New York City (Res., 2 Purser Pl., Yonkers, N. Y.)....	Jun. Assoc. M.	Nov. 8, 1909 April 7, 1915
THOMPSON, GORDON SAXTON. Instr. in Dept. of Mechanics, Rensselaer Polytechnic Inst.; Advisory Engr., Town of Salem, 693 Second Ave., Troy, N. Y.....	Jun. Assoc. M.	Sept. 5, 1905 April 7, 1915

ASSOCIATE MEMBERS (*Continued*)

		Date of Membership.
WENTWORTH, GEORGE LANSING. Yonkers Insp., Catskill Aqueduct, Board of Water Supply, New York City, 1 Halcyon Pl., Yonkers, N. Y.....	Jun. Assoc. M.	April 6, 1909 April 7, 1915
WILLARD, ERNEST CLIFFORD. Engr. in Chg., Appraisal Dept., for Henry L. Gray, 841 Henry Bldg., Seattle, Wash. ....		April 7, 1915
WRIGHT, FRANCIS HERBERT. (International Eng. Co.), 116 South Michigan Ave., Chicago, Ill.....		Nov. 4, 1914

## JUNIORS

BEERBOWER, DUMONT. 2901 Sixteenth St., N. W., Washington, D. C.....		April 7, 1915
BEOLA, PABLO TOMÁS. Gibara, Cuba.....		April 7, 1915
BERKEFELD, JOHN WOLFRAM. 227 Bonita Ave., Piedmont, Cal. ....		April 7, 1915
BISHOP, GUY HERSEY. City Engr., Oelwein, Iowa.....		Dec. 2, 1914
CONNOLLY, DONALD HILARY. First Lieut., Corps of Engrs., U. S. A., Fort Sam Houston, Tex.....		April 7, 1915
CRAWFORD, IVAN CHARLES. Instr. in Civ. Eng., Univ. of Colorado, Boulder, Colo.....		Mar. 2, 1915
HARTFORD, FRED DAILEY. Designer and Design Checker for H. S. Crocker, 308 Tramway Bldg., Denver, Colo. ....		April 7, 1915
HELM, FRANK. Office Engr., A., T. & S. F. Ry., Western Lines, La Junta, Colo.....		April 7, 1915
HOLROYD, GEORGE MCINTYRE. Cons. and Estimating Engr. (George McL. Holroyd, Inc.), 23 Douw Bldg., Albany, N. Y.....		April 7, 1915
HOLSTLAW, CHARLES HENRY ELLIOTT. Engr. (Bidwell & Holstlaw), 401½ Clematis Ave., West Palm Beach, Fla.....		April 7, 1915
INGHAM, EDWIN AMBLER. 514 Central Bldg., Los Angeles, Cal. ....		Jan. 6, 1915
MURDOCK, ROBERT BRUCE. Crown Point, N. Y.....		Jan. 6, 1915
OBERMEYER, WALTER SCOTT. 934 St. James St., Pittsburgh, Pa. ....		April 7, 1915
RANDOLPH, JAMES ROBBINS. Blacksburg, Va.....		Nov. 4, 1914
RHYNUS, CLARENCE PAULDING. San. Bacteriologist, U. S. Public Health Service, Hygienic Laboratory, Washington, D. C.....		April 7, 1915
STRACHAN, JOSEPH JOSLIN. 371 Grant Ave., Richmond Hill, N. Y.....		April 7, 1915
SUMMERS, RICHARD ELVIN JEWELL. 2102 South 8th St., Tacoma, Wash.....		Nov. 4, 1914

Fairs.

of  
rship.

1909  
1915

1915

1914

1915

1915

1915

1914

1915

1915

1915

1915

1915

1915

May, 1915.]

# MEMBERSHIP—CHANGES OF ADDRESS

363

## JUNIORS (*Continued*)

Date of  
Membership.

WHITE, ROY ALLERT. Surv. and Insp., U. S. Army Engr.  
Corps, Box 72, Louisville, Ky..... April 7, 1915

## CHANGES OF ADDRESS

### MEMBERS

ALLARD, THOMAS THROP. 834 North 24th St., Philadelphia, Pa.  
ASHMEAD, FRANK MILLIGAN. Asst. to Prin. Asst. Engr., B. & A. V. Div.,  
P. R. R., 445 Ashland Ave., Buffalo, N. Y.  
AUCHINCLOSS, WILLIAM S. Atlantic Highlands, N. J.  
AVERILL, FRANK LLOYD. Supt., Library of Congress Bldg. and Grounds,  
Washington, D. C.  
BISSELL, CLINTON TALCOTT. Engr., Committee on Fire Prevention, National  
Board of Fire Underwriters, 76 William St., New York City.  
BONSTOW, THOMAS LACEY. Care, S. Pearson & Son, Ltd., Royal Albert  
Dock Extension, North Woolwich, London, E., England.  
BROWNE, WILLIAM LYON. 380 Elm Ave., Westmount, Que., Canada.  
BRUCE, JOHN AUGUSTUS. Cons. Engr. (Bruce & Standeven), 430 Bee Bldg.,  
Omaha, Nebr.  
BRYANT, BYRON HARKNESS. Care, W. B. Bryant, 1059 North Shore Ave.,  
Chicago, Ill.  
BUDGE, EDWARD BARNARD. Cons. Engr., Chacabuco St. 61, Valparaiso,  
Chili.  
COLLIER, WILLIAM NEVILLE. Superv. Supt. of Constr., U. S. Public Bldgs.,  
Room 205, Post Office Bldg., Kansas City, Mo.  
DE WITT, PHILIP HOFFECKER. Contr. and Engr. (S. B. Mutchler & Co.),  
30 Church St., Room 402 E, New York City.  
DORR, EDGAR SUTTON. Office Engr., Sewer Service, Sewer and Water Div.,  
Public Works Dept., 701 City Hall Annex, Boston, Mass.  
GOODWIN, JAMES BOWMAN. Asst. Hydr. Engr., Hydro-Elec. Power Comm.  
of Ontario, 505 West Marion St., Toronto, Ont., Canada.  
HANSEL, CHARLES. Pres., Charles Hansel & Co., Suite 1945, Equitable  
Bldg., New York City.  
HODGE, HARRY SEYMOUR. Univ. of Virginia, Charlottesville, Va.  
HOLBROOK, JOHN BYERS. Cons. Engr., 52 Vanderbilt Ave., New York City.  
HUBBELL, CLARENCE WILLIAM. Cons. Engr., 2334 Dime Bank Bldg., Detroit,  
Mich.  
JARRETT, EDWIN SETON. Contr. (Jarrett-Chambers Co., Inc.), 30 East  
42d St., New York City.  
JEWEL, LINDSEY LOUIN. Rosemont Villa, Saranac Lake, N. Y.  
JONES, ARTHUR LEWIS. Fernyhurst, Ashstead, Surrey, England.  
JUENGST, HENRY FREDERICK. Care, Joplin Water Works Co., Joplin, Mo.  
KNIGHT, JOSEPH MARR. Care, Sir John Jackson, Ltd., 8 New St., Salia-  
bury, Wiltshire, England.  
KNOX, STUART KELSEY. 67 Union St., Montclair, N. J.

MEMBERS (*Continued*)

- McGONIGLE, CHARLES JOSEPH. Pres., Western Sheet Metal Works, 13th and Pettygrove Sts., Portland, Ore.
- MATAMOROS, LUIS. Ingeniero Consultor, P. O. Box 295, San José, Costa Rica.
- MATHEWSON, THOMAS KNIGHT. 1563 North Lake Ave., Pasadena, Cal.
- MORDECAI, AUGUSTUS. Cons. and Const. Engr., 1311 Citizens Bldg., Cleveland, Ohio.
- MORSE, CHARLES FRANCIS. Asst. Engr., New York State Dept. of Highways, 57 South Clinton St., Poughkeepsie, N. Y.
- MORSE, HOWARD SCOTT. Director, Cincinnati Bureau of Municipal Research, 804 Neave Bldg. (Res., 2122 Auburn Ave.), Cincinnati, Ohio.
- PERKINS, WILLIAM WARR CASSIDY. Chf. Engr., Dunn Wire-Cut-Lug Brick Co., Conneaut, Ohio.
- RICHARDS, ALBERT LENNOX. U. S. Asst. Engr., Care, U. S. Engr. Office, Hannibal, Mo.
- ROCKWELL, JAMES VINCENT. Civ. Engr., U. S. N., Navy Yard, Brooklyn, N. Y.
- ROUKE, LOUIS KEEGAN. 6 Wayne St., Roxbury, Mass.
- SHAW, SUMNER FARNHAM. Apartado No. 38, Guatemala, Guatemala.
- SIBERT, WILLIAM LUTHER. Brig-Gen., U. S. A., Fort Miley, Cal.
- STEGNER, CLIFFORD MILTON. Archt. and Engr. (Stegner & Hughes), 1012 Commercial Tribune Bldg., Cincinnati, Ohio.
- STEPHENS, CLINTON F. Care, Miss Kate Stephens, 420 West 124th St., New York City.
- STONE, EVERETT EDWARD. Member, Public Service Comm., State of Massachusetts, 1 Beacon St., Boston, Mass.
- STUART, JOSEPH THOMPSON. Pres., Brann & Stuart Co., Inc., 311 Commercial Trust Bldg., Philadelphia, Pa.
- SWAAB, SOLOMON MARK. Cons. Engr., 705 Pennsylvania Bldg., Philadelphia, Pa.
- SWIFT, WILLIAM EVERETT. With Ford, Bacon & Davis, 115 Broadway, New York City (Res., Amenia, N. Y.).
- THURBER, CLINTON DRAPER. Lt.-Commander, Corps of Civ. Engrs., U. S. N., Care, Bureau of Yards and Docks, Navy Dept., Washington, D. C.
- VAN NORDEN, ERNEST MAITLAND. Civ. Engr., New York Edison Co., 130 East 15th St., New York City (Res., 1561 President St., Brooklyn, N. Y.).
- WAGNER, SAMUEL TOBIAS. Chf. Engr., P. & R. Ry., Reading Terminal, Philadelphia, Pa.
- WALSH, GEORGE SCHERZER. Gen. Supt., Chiriqui Ry., David, Chiriqui, Panama.
- WHEELER, WALTER SCOTT. Cons. Engr., 30 East 42d St., New York City.
- WOLFE, FRANK CHARLES. 130 West Lanvale St., Baltimore, Md.
- WOODBURY, WILLIAM HOOK. Asst. Engr., Valuation Dept., G. N. Ry., St. Paul, Minn.



MEMBERS (*Continued*)

WORTHINGTON, CHARLES. 165 West 71st St., New York City.  
YATES, PRESTON KING. Cons. Engr., Room 1045, Equitable Bldg., New York City.

## ASSOCIATE MEMBERS

ADAMS, CHARLES ROBERT. 1437 L St., Fresno, Cal.  
ALLEN, CHESTER SALISBURY. Concrete Engr., Lockwood, Greene & Co., 60 Federal St., Boston, Mass.  
BALLOU, HENRY WELCOME. 735 Grosvenor Bldg., Providence, R. I.  
BENEDICT, FARRAND NORTHROP. Engr., Thomas Crimmins Contr. Co., 33 South Maple Ave., East Orange, N. J.  
BERNHARD, JOHANNES HELENUS. 52 Broadway, Room 1123, New York City.  
BESWICK, JAMES EVERETT. 19 Fort Pl., New Brighton, N. Y.  
BILYEU, CHARLES SMITH. New York Representative, Colby & Christie, 165 Broadway, New York City.  
BINGHAM, CLARENCE ARMINGER. Gen. Mgr., Town of Norwood, Norwood, Mass.  
BROOKS, JOHN NIXON. Douglaston, N. Y.  
BURNELL, EUGENE. Room 617, Union Bank Bldg., Winnipeg, Man., Canada.  
BURROUGHS, FREDRIC SIDNEY. Care, McClellan & Campion, 141 Broadway, New York City.  
BUTLER, MILLARD ANGLE. Div. Engr., G. N. Ry., 508 Broadway, Fargo, N. Dak.  
CHAPPELL, CLAUDE EDWARD. 402 South Main St., Charlotte, Mich.  
CLOUGH, ALBERT HASKELL. 1036 Mills Bldg., San Francisco, Cal.  
COLMAN, JAMES BLAINE THOMAS. Cons. Engr., 702 Kresge Bldg., Detroit, Mich.  
COWPER, JOHN WHITFIELD. Pres., The J. W. Cowper Co., Inc., Fidelity Bldg., Buffalo, N. Y.  
CRANE, ERNEST BUCHANAN. Asst. Engr., C., M. & St. P. Ry., Seattle, Wash.  
CUMMIN, GAYLORD CHURCH. City Mgr., Jackson, Mich.  
DAY, ERNEST BUEL. Asst. Engr., Hudson & Man. R. R., 30 Church St. (Res., 435 Fort Washington Ave.), New York City.  
DIAMANT, ARTHUR HERBERT. Managing Engr., William Oppenheim, Mongaup Valley, N. Y.  
DIXON, DE FOREST HALSTED. Second Vice-Pres., Turner Constr. Co., 11 Broadway, New York City (Res., 71 Gates Ave., Montclair, N. J.).  
DRAYTON, NEWBOLD. With E. I. du Pont de Nemours Powder Co., Care, Riverside Club, Penns Grove, N. J.  
ELLIOTT, JOHN ARTHUR. Dist. Engr., Oregon State Highway Comm., R. F. D. No. 3, Hood River, Ore.  
FEREBEE, JAMES LUMSDEN. Prin. Asst. Engr., Milwaukee Sewerage Comm., City Hall, Milwaukee, Wis.  
FRANCIS, WILLIAM. Earlham, Iowa.

ASSOCIATE MEMBERS (*Continued*)

- GARDNER, HARRY CARTER. Chf. Engr., John H. Wickersham, 724 North Lime St., Lancaster, Pa.
- GOODWIN, IRVING DEAN. Asst. Engr., Pittsburgh-Des Moines Steel Co., 806 Curry Bldg. (Res., 1514 Dormont Ave., Dormont), Pittsburgh, Pa.
- GRAVES, GEORGE AUGUSTUS. With Valuation Dept., B. & M. R. R., North Station, Boston (Res., 38 Avon St., Reading), Mass.
- GRONER, TRYGVE DANIEL BODTKER. Chf. Engr., D. T. & I. R. R., Springfield, Ohio.
- HALE, HERBERT MILLER. Care, Holbrook, Cabot & Rollins Corporation, 52 Vanderbilt Ave., New York City.
- HAMILTON, FARRAR PETRIE. Care, Southern Pine Assoc., Interstate Bank Bldg., New Orleans, La.
- HAMMOND, LESTER CLARK. Supt., Turner Constr. Co., 312 Prudential Bldg., Buffalo, N. Y.
- HATTAN, WILLIAM CARY. Div. Engr., Carolina, Clinchfield & Ohio Ry., Lexington, Va.
- HAYES, ANDREW JENKINS. 78 Lake Pl., New Haven, Conn.
- HAYS, DONALD SYMINGTON. 644 Everett St., Portland, Ore.
- HELLER, JOHN WALTER. Eng. Contr., Post Office Bldg., South Orange, N. J.
- HOWES, CYRUS PIERCE. Care, Engr. of Structures, B. & M. R. R., North Station, Boston, Mass.
- JACOBS, ROBERT HYDE. Senior Asst. Div. Engr., Public Service Comm., First Dist., 70 East 45th St., New York City.
- JONES, PERCY FRANCIS. Care, Modesto Irrig. Dist., Modesto, Cal.
- JORDAN, MYRON KENDALL. Draftsman, Kansas City Structural Steel Co., 729 Hamilton Terrace, Kansas City, Mo.
- KASSEBAUM, FREDERICK WILLIAM, JR. Care, D. Kassebaum, 4541 North Racine Ave., Chicago, Ill.
- KEPPEL, PAUL HENRY. Care, Plant No. 2, Du Pont Powder Co., Penns Grove, N. J.
- KINGSCOTT, WALTER JOHN. Box 516, Shreveport, La.
- KITTS, JOSEPH ARTHUR. 2803 Forest Ave., Berkeley, Cal.
- LEACH, THOMAS. 506 Old Orchard Ave., Notre Dame de Grace, Montreal, Que., Canada.
- LUDWIG, JULIUS ALFRED. Supt., Bureau of Bldgs., Borough of Manhattan, 20th Floor, Municipal Bldg., New York City.
- McCLAIN, JAMES BROWNSON. Res. Engr., Bridge Dept., Seaboard A. L. Ry., 344½ East Duval St., Jacksonville, Fla.
- MASHBURN, LEON WADDELL. Chf. Engr., Southern Eng. Co., Clarksdale, Miss.
- MUNN, ALEXANDER MAJORS. Director and Secy., Munn-Reise Constr. Co., Daniels Bldg., Kansas City, Mo.
- PETERSON, OTTO WALLACE. Res. Constr. Engr., Modesto Irrig. Dist., La Grange, Cal.

ASSOCIATE MEMBERS (*Continued*)

- PHILIPS, GEORGE WASHINGTON. Res. Engr., San. Sewerage Constr., Troy, Pa.  
PHIPPS, THOMAS ELMER. Chf. Engr., Public Service Comm., 3444 Florence Court, Seattle, Wash.  
PRICE, WILLIAM EDMUND. Gen. Contr., Associated with A. O. Campbell, 610 Majestic Bldg., Oklahoma, Okla.  
RABINOWITZ, LOUIS. Care, Barrow Farm, Napanoch, N. Y.  
RHODES, CLAUDE IRVIN. Asst. Engr., California State R. R. Comm., 280 Ninth Ave., San Francisco, Cal.  
RICE, JOHN MARIE THOMAS. With Morris Knowles, Cons. Engr., 2541 Oliver Bldg. (Res., 5435 Black St.), Pittsburgh, Pa.  
RICHARDSON, CHARLES POTTER. Asst. Engr., Track Elev., Rock Island Lines, 7330 Lowe Ave., Chicago, Ill.  
RICHMOND, JACKSON LITTON. Gen. Contr., Grant, N. Y.  
ROSENTHAL, JOSEPH JACOB. 525 Market St., Room 220, San Francisco, Cal.  
SCHEIDENHELM, FREDERICK WILLIAM. Cons. Engr., Benedum Trees Bldg., Pittsburgh, Pa.  
SCHRYVER, HOWARD FRENCH. Asst. Valuation Engr., T. & O. Cent. Ry., 405 New York Central Bldg., Columbus, Ohio.  
SLATON, CHARLES ALBERT. Care, Corrigan & Halpin, Reserve Bank Bldg., Kansas City, Mo.  
SMITH, JONATHAN RHODES. Care, W. R. Smith, Merry Hill, N. C.  
STRATE, THOMAS HENRY. 3416 Aldrich Ave., South, Minneapolis, Minn.  
THOMPSON, MORRIS. Engr. and Gen. Supt., Bates & Hudnall, 561 Grove St., Milwaukee, Wis.  
TOLLES, FRANK CLIFTON. 59 Franklin St., Buffalo, N. Y.  
TREVARTHEN, DWIGHT CUTLER. P. O. Box 49, Florence, Ala.  
WAGNER, ALLAN JOHN. Care, California Highway Comm., 515 Forum Bldg., Sacramento, Cal.  
WAIT, BERTRAND HINMAN. Div. Engr., State Comm. of Highways, Columbus Inst., Poughkeepsie, N. Y.  
WALTER, FRANK EDGAR. 1030 West Exchange St., Akron, Ohio.  
WEIDEL, JOSEPH. 517 West 14th St., Topeka, Kans.  
WELLER, WILLIAM EARL. Deputy City Engr., 501 Rugby Rd., Schenectady, N. Y.  
WICKLINE, GEORGE GROVER. Care, City Engr., Dallas, Tex.

## ASSOCIATE

- WILSON, HUGH MONROE. Vice-Pres. and Gen. Mgr., McGraw Pub. Co., Inc., 239 West 39th St., New York City (Res., Little Woods, Park Rd., Hartsdale, N. Y.).

## JUNIORS

- BOLIN, HARRY WILLIAM. 1620 Jordan St., Portland, Ore.  
BOWEN, EDWARD WITHERS. Care, C. W. Requarth Co., Commercial National Bank Bldg., Charlotte, N. C.

JUNIORS (*Continued*)

- CARTWRIGHT, HENRY HART. Asst. Engr., Valuation Dept., N. C. & St. L. Ry., Nashville, Tenn.
- CLIFT, WILLIAM BROOKS. Secy.-Treas., Capitol City Constr. Co., 1 Berry Blk., Nashville, Tenn.
- COCHRAN, JEROME. 1518 Hamilton St., Houston, Tex.
- DAVIS, WILLIAM EILERT. 659 Second Ave., San Francisco, Cal.
- DENSLE, FRANK HASKELL. 825 Myrtle Ave., Albany, N. Y.
- DIMMLER, CHARLES LOUIS. Asst. Engr., Div. of Works, Panama-Pacific International Exposition, 1911 Cedar St., Berkeley, Cal.
- GIBBLE, ISAAC OBERHOLZER. With The Trussed Concrete Steel Co., 817 Commerce Bldg., St. Paul, Minn.
- HARDING, EDWARD CRITTENDEN, JR. Chf. of Grade Party, New Sewer System, 308 Odd Fellows Temple, Cincinnati, Ohio.
- HAVENS, WILLIAM WESTERFIELD. Junior Engr., 7th Div., Public Service Comm., First Dist., New York State, 2231 Grand Boulevard and Concourse, New York City.
- HELLING, HARRY ALBERTUS. Asst. Engr., State Highway Dept., Box 742, Liberty, N. Y.
- HOSSACK, ARCHIBALD BABCOCK. Solicitor, The American Appraisal Co., 85 Devonshire St., Room 1011, Boston, Mass.
- KRAUSS, JOHN JACOB. 992 Warren Ave., West, Detroit, Mich.
- LATIMER, CLAUDE ALFRED. 3021 Richmond Terrace, Mariners Harbor, N. Y.
- LEMCKE, KARL WOLFGANG. 117 Pine St., Harrisburg, Pa.
- LEONARD, EDWARD PHILIP. Care, The Elec. Bond & Share Co., 71 Broadway, New York City (Res., 887 Lincoln Pl., Brooklyn, N. Y.).
- MAY, DONALD CURTIS. Care, Gardner S. Williams, Ann Arbor, Mich.
- PARKER, HENRY BRACKETTE. Delmar, N. Y.
- PERRINE, HAROLD. Care, E. I. du Pont de Nemours Powder Co., Wilmington, Del.
- PRICE, JOSEPH. Asst. Supt., U. S. Lighthouse Service, U. S. Lighthouse Office, Buffalo, N. Y.
- SEARIGHT, GEORGE PETER. 313 South Hanover St., Carlisle, Pa.
- SEE, RUSSELL ALVA. Care, U. S. Reclamation Service, Camp No. 9, Babb, Mont.
- SEELEY, HENRY ARTHUR. 130 East 15th St., Room 540, New York City.
- SELBY, OSCAR ELLSWORTH. Prin. Asst. Engr., C., C., C. & St. L. Ry., Cincinnati, Ohio.
- STARR, WILLIAM H. Hotel Marlton, 3 West 8th St., New York City.
- SWARTZ, LEON EMERSON. Care, Bell-Bockel Co., Inc., Altoona, Pa.
- TATE, ROBERT L'HOMMEDIEU. 1097 Elmwood Ave., Buffalo, N. Y.
- THACKWELL, HENRY LAWRENCE. Civ. and Hydr. Engr., 1345 Franklin St., Denver, Colo.
- WEITZNER, HENRY MITCHEL. With New York Municipal Ry. Corporation, 85 Clinton St., Brooklyn, N. Y. (Res., 867 Beck St., New York City).
- WELLES, THEODORE LADD, JR. 1427 North Front St., Harrisburg, Pa.

## DEATHS

- KENNEDY, WILLIAM HARLIN. Elected Member, September 6th, 1871; died March 14th, 1915.
- SHERBERD, JOHN MAXWELL. Elected Member, July 10th, 1907; died April 15th, 1915.
- SIMPSON, GEORGE FREDERIC. Elected Member, March 2d, 1887; died April 23d, 1915.
- SMITH, FRANCIS HOPKINSON. Elected Associate, April 5th, 1892; died April 7th, 1915.
- TOWER, MORTON LOUDON. Elected Associate Member, May 6th, 1908; Member, July 1st, 1909; died April 15th, 1915.
- VIELÉ, MAURICE AUGUSTUS. Elected Junior, February 4th, 1891; Associate Member, September 7th, 1892; Member, October 6th, 1897; died April 10th, 1915.

---

**Total Membership of the Society, May 6th, 1915,**

**7 789**

# MONTHLY LIST OF RECENT ENGINEERING ARTICLES OF INTEREST

(April 5th to May 3d, 1915)

NOTE.—This list is published for the purpose of placing before the members of this Society, the titles of current engineering articles, which can be referred to in any available engineering library, or can be procured by addressing the publication directly, the address and price being given wherever possible.

## LIST OF PUBLICATIONS

In the subjoined list of articles, references are given by the number prefixed to each journal in this list:

- (1) *Journal*, Assoc. Eng. Soc., St. Louis, Mo., 30c.
- (2) *Proceedings*, Engrs. Club of Phila., Philadelphia, Pa.
- (3) *Journal*, Franklin Inst., Philadelphia, Pa., 50c.
- (4) *Journal*, Western Soc. of Engrs., Chicago, Ill., 50c.
- (5) *Transactions*, Can. Soc. C. E., Montreal, Que., Canada.
- (6) *School of Mines Quarterly*, Columbia Univ., New York City, 50c.
- (7) *Gesundheits Ingenieur*, München, Germany.
- (8) *Stevens Institute Indicator*, Hoboken, N. J., 50c.
- (9) *Engineering Magazine*, New York City, 25c.
- (11) *Engineering* (London), W. H. Wiley, 432 Fourth Ave., New York City, 25c.
- (12) *The Engineer* (London), International News Co., New York City, 35c.
- (13) *Engineering News*, New York City, 15c.
- (14) *Engineering Record*, New York City, 10c.
- (15) *Railway Age Gazette*, New York City, 15c.
- (16) *Engineering and Mining Journal*, New York City, 15c.
- (17) *Electric Railway Journal*, New York City, 10c.
- (18) *Railway Review*, Chicago, Ill., 15c.
- (19) *Scientific American Supplement*, New York City, 10c.
- (20) *Iron Age*, New York City, 20c.
- (21) *Railway Engineer*, London, England, 1s. 2d.
- (22) *Iron and Coal Trades Review*, London, England, 6d.
- (23) *Railway Gazette*, London, England, 6d.
- (24) *American Gas Light Journal*, New York City, 10c.
- (25) *Railway Age Gazette*, Mechanical Edition, New York City, 20c.
- (26) *Electrical Review*, London, England, 4d.
- (27) *Electrical World*, New York City, 10c.
- (28) *Journal*, New England Water-Works Assoc., Boston, Mass., \$1.
- (29) *Journal*, Royal Society of Arts, London, England, 6d.
- (30) *Annales des Travaux Publics de Belgique*, Brussels, Belgium, 4 fr.
- (31) *Annales de l'Assoc. des Ing. Sortis des Ecoles Spéciales de Gand*, Brussels, Belgium, 4 fr.
- (32) *Mémoires et Compte Rendu des Travaux*, Soc. Ing. Civ. de France, Paris, France.
- (33) *Le Génie Civil*, Paris, France, 1 fr.
- (34) *Portefeuille Economiques des Machines*, Paris, France.
- (35) *Nouvelles Annales de la Construction*, Paris, France.
- (36) *Cornell Civil Engineer*, Ithaca, N. Y.
- (37) *Revue de Mécanique*, Paris, France.
- (38) *Revue Générale des Chemins de Fer et des Tramways*, Paris, France.
- (39) *Technisches Gemeindeblatt*, Berlin, Germany, 0, 70m.
- (40) *Zentralblatt der Bauverwaltung*, Berlin, Germany, 60 pf.
- (41) *Electrotechnische Zeitschrift*, Berlin, Germany.
- (42) *Proceedings*, Am. Inst. Elec. Engrs., New York City, \$1.
- (43) *Annales des Ponts et Chaussées*, Paris, France.
- (44) *Journal*, Military Service Institution, Governors Island, New York Harbor, 50c.
- (45) *Colliery Engineer*, Scranton, Pa., 25c.
- (46) *Scientific American*, New York City, 15c.
- (47) *Mechanical Engineer*, Manchester, England, 3d.
- (48) *Zeitschrift*, Verein Deutscher Ingenieure, Berlin, Germany, 1, 60m.
- (49) *Zeitschrift für Bauwesen*, Berlin, Germany.
- (50) *Stahl und Eisen*, Düsseldorf, Germany.
- (51) *Deutsche Bauzeitung*, Berlin, Germany.
- (52) *Rigasche Industrie-Zeitung*, Riga, Russia, 25 kop.
- (53) *Zeitschrift*, Oesterreichischer Ingenieur und Architekten Verein, Vienna, Austria, 70h.
- (54) *Transactions*, Am. Soc. C. E., New York City, \$12.
- (55) *Transactions*, Am. Soc. M. E., New York City, \$10.
- (56) *Transactions*, Am. Inst. Min. Engrs., New York City, \$6.



- (57) *Colliery Guardian*, London, England, 5d.  
 (58) *Proceedings*, Engrs.' Soc. W. Pa., 2511 Oliver Bldg., Pittsburgh, Pa., 50c.  
 (59) *Proceedings*, American Water-Works Assoc., Troy, N. Y.  
 (60) *Municipal Engineering*, Indianapolis, Ind., 25c.  
 (61) *Proceedings*, Western Railway Club, 225 Dearborn St., Chicago, Ill., 25c.  
 (62) *Steel and Iron*, Thaw Bldg., Pittsburgh, Pa., 10c.  
 (63) *Minutes of Proceedings*, Inst. C. E., London, England.  
 (64) *Power*, New York City, 5c.  
 (65) *Official Proceedings*, New York Railroad Club, Brooklyn, N. Y., 15c.  
 (66) *Journal of Gas Lighting*, London, England, 6d.  
 (67) *Cement and Engineering News*, Chicago, Ill., 25c.  
 (68) *Mining Journal*, London, England, 6d.  
 (69) *Der Eisenbau*, Leipzig, Germany.  
 (71) *Journal*, Iron and Steel Inst., London, England.  
 (71a) *Carnegie Scholarship Memoirs*, Iron and Steel Inst., London, England.  
 (72) *American Machinist*, New York City, 15c.  
 (73) *Electrician*, London, England, 18c.  
 (74) *Transactions*, Inst. of Min. and Metal., London, England.  
 (75) *Proceedings*, Inst. of Mech. Engrs., London, England.  
 (76) *Brick*, Chicago, Ill., 20c.  
 (77) *Journal*, Inst. Elec. Engrs., London, England, 5s.  
 (78) *Beton und Eisen*, Vienna, Austria, 1, 50m.  
 (79) *Forscheraarbeiten*, Vienna, Austria.  
 (80) *Tonindustrie Zeitung*, Berlin, Germany.  
 (81) *Zeitschrift für Architektur und Ingenieurwesen*, Wiesbaden, Germany.  
 (82) *Mining and Engineering World*, Chicago, Ill., 10c.  
 (83) *Gas Age*, New York City, 15c.  
 (84) *Le Ciment*, Paris, France.  
 (85) *Proceedings*, Am. Ry. Eng. Assoc., Chicago, Ill.  
 (86) *Engineering-Contracting*, Chicago, Ill., 10c.  
 (87) *Railway Engineering and Maintenance of Way*, Chicago, Ill., 10c.  
 (88) *Bulletin of the International Ry. Congress Assoc.*, Brussels, Belgium.  
 (89) *Proceedings*, Am. Soc. for Testing Materials, Philadelphia, Pa., \$5.  
 (90) *Transactions*, Inst. of Naval Archts., London, England.  
 (91) *Transactions*, Soc. Naval Archts. and Marine Engrs., New York City.  
 (92) *Bulletin*, Soc. d'Encouragement pour l'Industrie Nationale, Paris, France.  
 (93) *Revue de Métallurgie*, Paris, France, 4 fr. 50.  
 (95) *International Marine Engineering*, New York City, 20c.  
 (96) *Canadian Engineer*, Toronto, Ont., Canada, 10c.  
 (98) *Journal*, Engrs. Soc. Pa., Harrisburg, Pa., 30c.  
 (99) *Proceedings*, Am. Soc. of Municipal Improvements, New York City, \$2.  
 (100) *Professional Memoirs*, Corps of Engrs., U. S. A., Washington, D. C., 50c.  
 (101) *Metal Worker*, New York City, 10c.  
 (102) *Organ für die Fortschritte des Eisenbahnwesens*, Wiesbaden, Germany.  
 (103) *Mining Press*, San Francisco, Cal., 10c.  
 (104) *The Surveyor and Municipal and County Engineer*, London, England, 6d.  
 (105) *Metallurgical and Chemical Engineering*, New York City, 25c.  
 (106) *Transactions*, Inst. of Min. Engrs., London, England, 6s.  
 (107) *Schweizerische Bauzeitung*, Zürich, Switzerland.  
 (108) *Iron Tradesman*, Atlanta, Ga., 10c.  
 (109) *Journal*, Boston Soc. C. E., Boston, Mass., 50c.  
 (110) *Journal*, Am. Concrete Inst., Philadelphia, Pa., 50c.  
 (111) *Journal of Electricity, Power and Gas*, San Francisco, Cal., 25c.  
 (112) *Internationale Zeitschrift für Wasser-Versorgung*, Leipzig, Germany.  
 (113) *Proceedings*, Am. Wood Preservers' Assoc., Baltimore, Md.

## LIST OF ARTICLES

## Bridges.

- Unit Built Overhead Highway Bridges of Two Different Types.\* A. M. Wolf. (87) Jan.  
 Long Span Reinforced Concrete Deck Girder Bridge, Wabash R. R.\* A. M. Wolf. (87) Jan.  
 Novel Architectural Treatment of an Overhead Highway Bridge.\* A. M. Wolf. (87) Jan.  
 Glenmore Bridge, Philadelphia & Reading.\* A. M. Wolf. (87) Feb.  
 The Iowa Central Black Hawk Chute Bridge.\* (87) Feb.  
 Inspection of Highway Bridges. C. L. Crandall. (36) Mar.  
 Highway Culverts and Bridges. O. L. Grover. (36) Mar.  
 Structural Steel and Concrete Slab Bridge.\* Albert M. Wolf. (87) Apr.  
 Why Indiana Leads the World in Concrete Bridges. Daniel B. Luten. (67) Apr.

\* Illustrated.

M

B

M

A

C

S

(

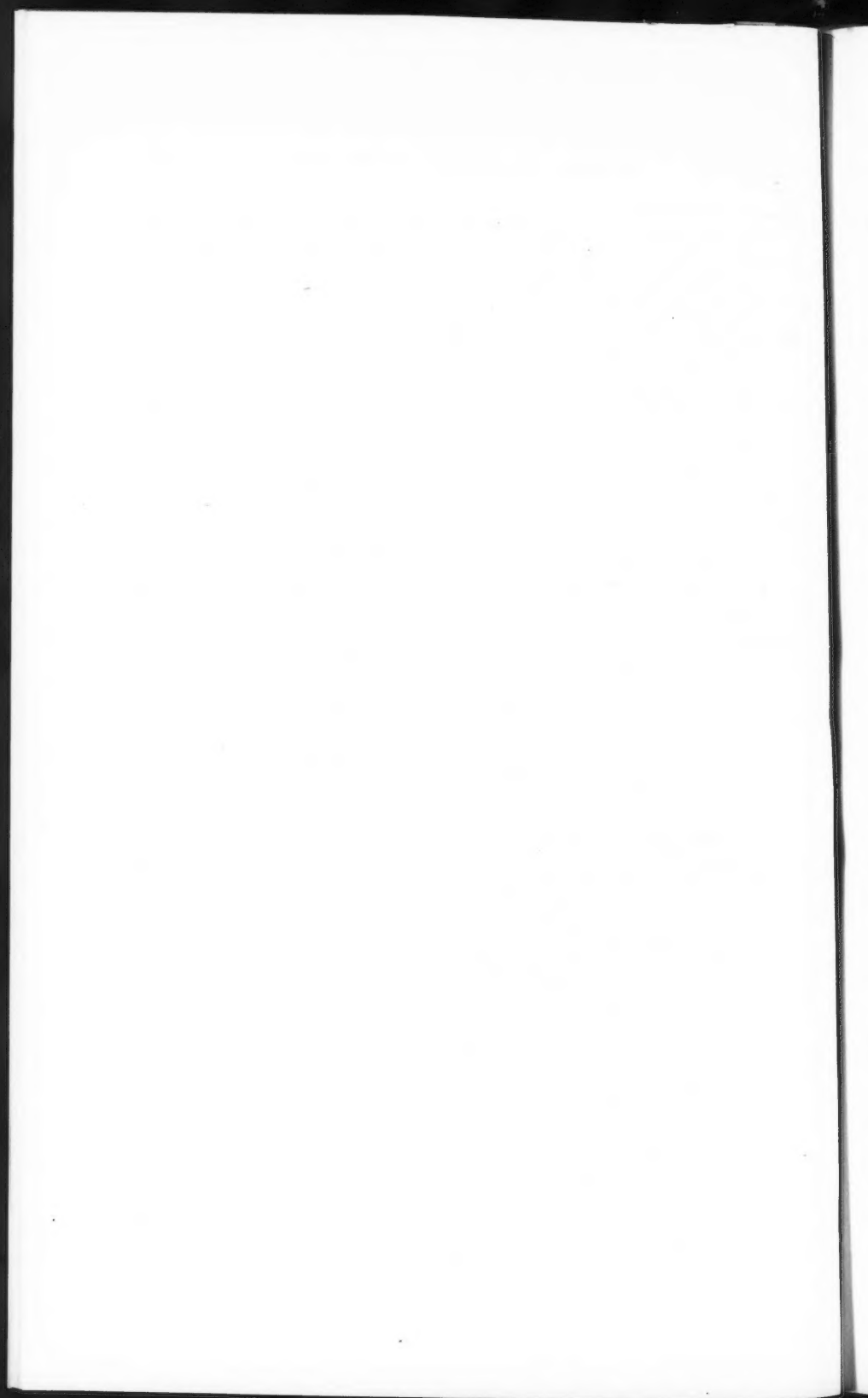
**Bridges—(Continued).**

- Methods and Equipment Used in Renewing Bridges Under Traffic on the Wheeling and Lake Erie R. R.\* (86) Apr. 7.
- A Type of Reinforced Concrete Floor for Beam Spans Designed to Replace a Wooden Floor.\* C. E. Nagel. (Paper read before the Minnesota Surveyors' and Engrs.' Soc.) (86) Apr. 7.
- Construction Features of the Reinforced Concrete Cantilever Bridge on Runnymede Ave., Cincinnati, Ohio.\* (86) Apr. 7.
- Sizing-Up and Bidding on a Contract in Dull Times.\* (13) Apr. 8.
- Shifting Two Milwaukee River Drawbridges, C. & N. W. Ry.\* (13) Apr. 8; (14) Apr. 10; (15) Apr. 16; (86) Apr. 21.
- A Lift Bridge Constructed on 4 Per Cent. Grade.\* Charles R. Waters. (13) Apr. 15.
- Foundation Problems in Bridge Work. (62) Apr. 15.
- Doubling Bridge Capacity on Old Piers.\* Charles C. Lynde. (62) Apr. 15.
- New B. R. & P. Structure Across Allegheny River at Riverside, N. Y.\* (15) Apr. 16.
- Provision for Traction Stresses in Quebec Bridge.\* C. A. Norton. (14) Apr. 17.
- Chart of Equivalent Uniform Loads for Railway Bridges.\* D. B. Steinman. (13) Apr. 22.
- Substructure of the New Harahan Bridge at Memphis.\* M. B. Case. (15) Apr. 23; (18) Apr. 24; (14) Apr. 24; (13) Apr. 22.
- Wood Cofferdams with Bottoms Sunk for Bridge in Swamp.\* C. E. Jones. (14) Apr. 24.
- Two Time-Savers for Use with Influence Lines.\* D. B. Steinman. (14) Apr. 24.
- Center Bearing Machinery and Gates, Congress St. Swingbridge, Troy, N. Y.\* (14) Apr. 29.
- C. P. R. Bridge over Lachine Canal.\* (96) Apr. 29.
- Fallway Viaduct in Baltimore Built on Sharp Curve with Concrete from 205-Foot Tower.\* (14) May 1.

**Electrical.**

- Power Costs. William B. Woodhouse. (Paper read before the Midland Inst. of Min., Civ., and Mech. Engrs.) (106) Vol. 49, Pt. 1.
- Tower Foundations for the Cristobal-Balboa Transmission Line.\* Ira W. Dye. (58) Jan.
- Extension of the Cos Cob Plant.\* Warren O. Rogers. (64) Mar. 16.
- Addition to the Westport Power Plant.\* Warren O. Rogers. (64) Mar. 23.
- 6 250-Kilowatt Reaction Turbine.\* (11) Serial beginning Mar. 26.
- The Practical Rating of Incandescent Lamps. Francis W. Willcox. (Abstract of paper read before the Illuminating Eng. Soc.) (73) Mar. 26; (26) Mar. 26.
- Ionisation. J. J. Thomson. (Abstract of paper read before the Physical Soc.) (73) Serial beginning Mar. 26.
- Recent Developments in Steam-Electric Generating Stations. John Hunter. (55) Apr.
- The Variable Resistance to Motion Offered by the Registering Trains of Electric Supply Meters.\* S. Evershed. (77) Apr. 1.
- Dimensions of Transformers.\* A. R. Low. (77) Apr. 1.
- Mathematical Relationship Between Flux and Magnetizing-Current Waves at High Flux Densities.\* A. L. Tackley. (77) Apr. 1.
- Distribution and Rise of Temperature in Field Coils.\* Magnus McLean, D. J. MacKellar, and R. S. Begg. (77) Apr. 1.
- The Supply of the Netherlands with Electric Energy. (11) Apr. 2.
- Telephone Engineering Economics.\* Harvey A. Smith. (Paper read before the Institution of Post Office Elec. Engrs.) (73) Apr. 9.
- The Cost and Efficiency of Transformers.\* W. E. Burnand. (73) Apr. 9.
- Atoms and Ions.\* J. J. Thomson. (Paper read before the Royal Institution.) (11) Apr. 9.
- The Examination of Metals by X Rays.\* (12) Apr. 9.
- Equipment of Large Publishing House.\* (27) Apr. 10.
- Effect on the Eye of Ultra-Violet Light.\* W. E. Burge. (27) Apr. 10.
- Protective Reactance Coils.\* (27) Apr. 10.
- High Voltage Potentiometers.\* Harris J. Ryan. (111) Apr. 10.
- Direct-Current Three-Wire Systems.\* Gordon Fox. (64) Apr. 13.
- Telephone Troubles in the Tropics.\* W. Llewellyn Preece. (77) Apr. 15.
- The Inherent Regulation of Synchronous Alternating-Current Generators.\* Alfred Still. (77) Apr. 15.
- The Development of Electric Power for Industrial Purposes in India.\* H. R. Speyer. (77) Apr. 15.
- Protective Devices Against Lightning and Surges.\* E. Kilburn Scott and L. F. Fogarty. (Paper read before the Assoc. of Min. Elec. Engrs.) (47) Serial beginning Apr. 16.
- On the Direct Measurement of Power Factor.\* R. D. Gifford. (73) Serial beginning Apr. 16.
- Wireless Transmission of Energy. Elihu Thomson. (19) Serial beginning Apr. 17.

\* Illustrated.



**Electrical—(Continued).**

- A New Era in Street Lighting.\* T. M. Stateler. (111) Apr. 24.  
 Substation of Lancaster Edison Company.\* (27) Apr. 24.  
 Power Plant of the Government Printing Office.\* Davis H. Tuck. (64) Apr. 27.  
 Controlling the Cost of Electricity.\* Walter N. Polakov. (9) May.  
 Using the Electric-Power Meter to Measure Wasted Production.\* Ralph E. Loper. (9) May.  
 Tall Concrete Poles Have Given Nine Years' Service.\* (14) May 1.  
 Analysis of Unbalanced Three-Phase Systems.\* L. G. Stokvis. (27) May 1.  
 Advantages and Limitations of Railway Motor Ventilation.\* Rudolf E. Hellmund. (17) May 1.  
 Das Anlassen von Einankerumformen.\* W. Linke. (41) Serial beginning Mar. 25.  
 Installationserleichterungen und Pauschaltarife. Hugo Eisenmenger. (41) Apr. 8.

**Marine.**

- The Revival of the Reversible Blade Propeller.\* (12) Mar. 26.  
 The Cylindrical-Tank Oil-Carrying Steamer *Ricardo A. Mestres*.\* (11) Apr. 16.  
 Raising the F-4.\* J. F. Springer. (46) Apr. 17.  
 Les Progrès Récents dans la Construction des Etats-Unis.\* (33) Apr. 17.

**Mechanical.**

- Report of Committee E-4, Am. Soc. for Testing Materials, on Methods of Sampling and Analysis of Coal. (89) Vol. 14, Pt. 1.  
 Report of Committee D-2, Am. Soc. for Testing Materials, on Standard Tests for Lubricants. (89) Vol. 14, Pt. 1.  
 Report of Committee D-11, Am. Soc. for Testing Materials, on Standard Specifications for Rubber Products. (89) Vol. 14, Pt. 1.  
 Proposed Provisional Tests for Lubricants. Am. Soc. for Testing Materials.\* (89) Vol. 14, Pt. 1.  
 Rubber Belting and Methods of Testing.\* W. E. Campbell. (89) Vol. 14, Pt. 2.  
 An Efficiency Testing Machine for Testing Drills, Taps, and Dies.\* T. T. Olsen. (89) Vol. 14, Pt. 2.  
 A New Vibratory Testing Machine and Results Obtained by Its Use.\* S. V. Hunnings. (89) Vol. 14, Pt. 2.  
 A Machine for Testing Clay Products.\* Mont Schuyler. (89) Vol. 14, Pt. 2.  
 An Autographic Friction Testing Machine for Testing Mechanical Rubber Goods. J. M. Bierer. (89) Vol. 14, Pt. 2.  
 A Simple Compression Machine for Testing Structural Materials.\* William O. Lichtner. (89) Vol. 14, Pt. 2.  
 Some Recent Developments in Commercial Motor-Vehicles.\* Thomas Clarkson. (63) Vol. 198.  
 The Flying-Machine from an Engineering Standpoint.\* Frederick William Lancaster. (63) Vol. 198.  
 Interesting Steam-Pipe Installation.\* Hubert E. Collins. (64) Mar. 2.  
 Plate Valves for High-Speed Air Compressors.\* G. J. MacFadden. (64) Mar. 16.  
 Steam Costs in 6 600-h.p. Boiler Plant. Frank G. Philo. (64) Mar. 16.  
 Properties of Saturated Air. W. D. Ennis. (64) Mar. 23.  
 The Use and Abuse of Oils on Mining Plant.\* T. C. Thomsen. (Paper read before the Assoc. of Min. Elec. Engrs.) (22) Mar. 26.  
 The Cracking of Oils with a View to Obtaining Motor Spirit and Other Products. William A. Hall. (Paper read before the Institution of Petroleum Technologists.) (68) Serial beginning Mar. 27.  
 Small Condensing Turbines.\* W. J. A. London. (64) Mar. 30.  
 A Large Wooden Flywheel (Berkeley, R. I.).\* (64) Mar. 30.  
 The Municipal Gas Plant of St. Petersburg, Florida.\* (60) Apr.; (24) Apr. 19.  
 The Clinkering of Coal.\* Lionel S. Marks. (55) Apr.  
 Coal Handling for Efficient Distribution.\* (62) Apr. 1.  
 Briquette Manufacture.\* (57) Apr. 1.  
 Power with By-Product Recovery. T. Roland Wollaston. (12) Apr. 2.  
 The Calculation of Centrifugal Stresses in Turbine Rotors.\* William Kerr. (Paper read before the Scientific Soc. of the Royal Technical College, Glasgow.) (47) Serial beginning Apr. 2.  
 Coal Gas Candle Power. L. J. Willien. (Paper read before the New England Assoc. of Gas Engrs.) (24) Apr. 5.  
 Efficiency Trials at the Obuda Gas-Works at Budapest. J. Pfelfer. (Paper read before the Assoc. of Gas and Water Engrs. of Austria and Hungary.) (66) Apr. 6.  
 Vertical Retorts in the United States. C. W. Hunter. (Paper read before the New England Assoc. of Gas Engrs.) (66) Apr. 6.  
 Large Surface Condenser for Commonwealth Edison Co.\* (64) Apr. 6.  
 Comparative Methods and Costs of Preparing Rock for Steam Shovels.\* Charles C. Phelps. (86) Apr. 7.  
 Service and Tests of 3-In. Wire Cable.\* (13) Apr. 8.

\* Illustrated.

M

M

M

A

T

I

N

S



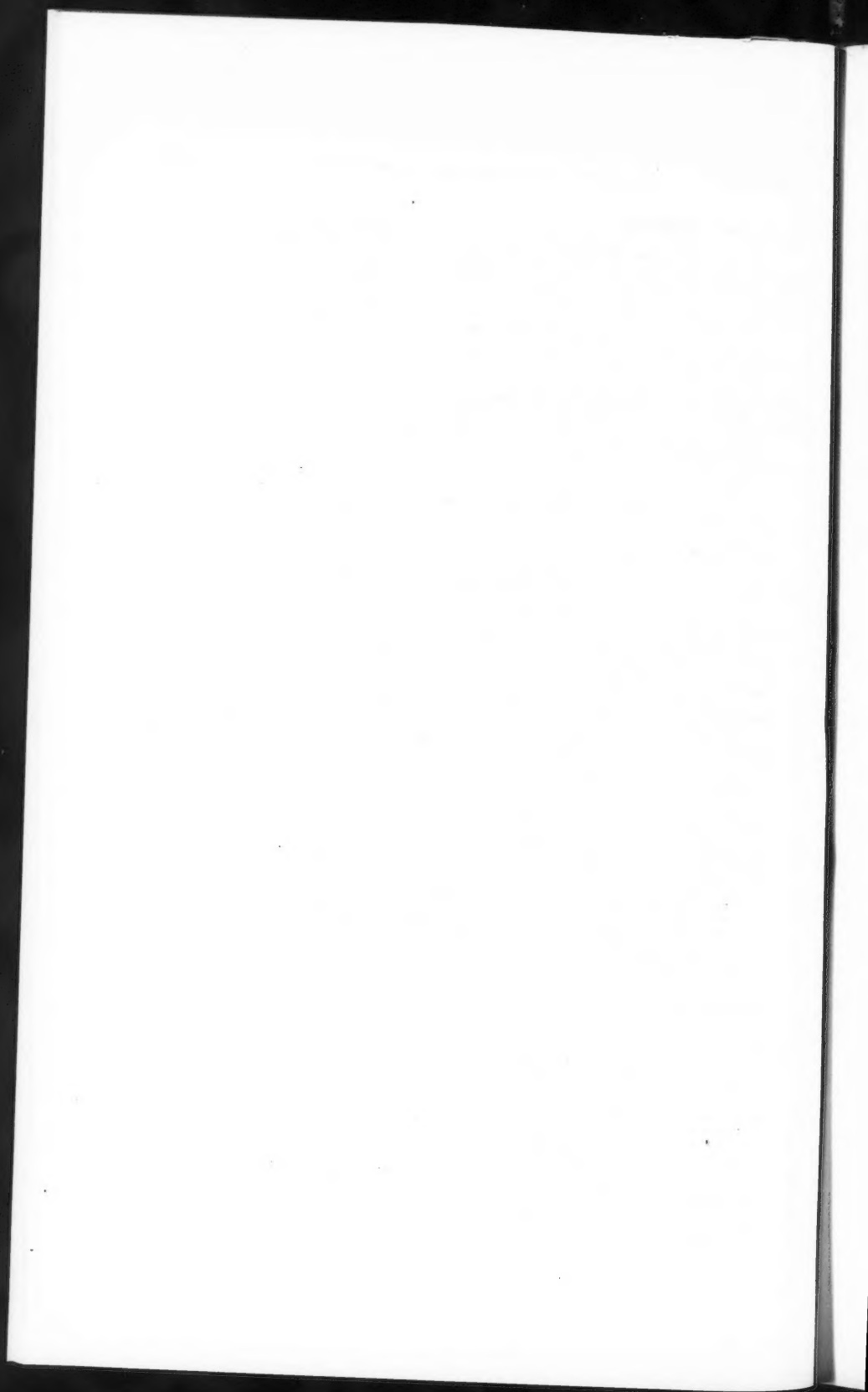
**Mechanical—(Continued).**

- Mechanical Stoking for Internally-Fired Boilers.\* Edwin Kenyon. (Abstract of paper read before the South Wales Inst. of Engrs.) (47) Apr. 9.
- Aerial Wire Ropeway for Automatic Disposal of Ashes.\* (26) Apr. 9.
- The Design of Rolling-Mills for Cold Metal.\* (11) Apr. 9.
- Power Formulas for Machine Tools. Alexander Dawes Du Bois. (27) Apr. 10.
- Wood as a Fuel for Mine Power Plants.\* E. A. Holbrook. (16) Apr. 10.
- Possible Economies from the Use of Exhaust Steam in a Water Gas Plant.\* S. A. Reinhard and C. A. Schnerr. (Paper read before the Illinois Gas Assoc.) (24) Apr. 12.
- Testing Lubricating Oils. A. H. Gill. (Paper read before the Detroit Eng. Soc.) (64) Apr. 13.
- Diesel-Engine Installation at Palo Alto.\* Herbert Haas. (64) Apr. 13.
- The Works of the Hornsey Gas Company.\* (66) Apr. 13.
- Some British Textile-Shop Methods.\* (72) Apr. 15.
- The Structure of Carbon Tool Steel.\* J. V. Emmons. (Paper read before the Cleveland Eng. Soc.) (20) Apr. 15.
- Practical Facts in Heat Treating Steel. R. A. Millholland. (20) Serial beginning Apr. 15.
- The Immediate Gas Engine Business.\* H. W. Edmund. (Paper read before the Illinois Gas Assoc.) (83) Apr. 15; (24) May 3.
- Large Capacity Station Meters.\* (83) Apr. 15.
- The Case for the Electrification of Portland Cement Works.\* Ernest P. Hollis. (26) Apr. 16.
- Small Automobile Opens Up New Opportunities in Government Stream Gaging Work, on U. S. Geological Survey.\* E. A. Porter. (14) Apr. 17.
- Cylinder Gates Increase Turbine Efficiency.\* A. G. Hillberg. (14) Apr. 17.
- Progress in Aeronautics. H. Bannerman-Phillips. (From the *United Service Magazine*.) (19) Apr. 17.
- Concrete Coaling Station, L. & N. R. R., Lebanon Junction, Ky.\* (18) Apr. 17.
- Essentials of Modern Gas Composition. William Cranfield. (Paper read before the Scottish Junior Gas Assoc.) (66) Apr. 20.
- Theoretical Efficiency of Heat Engines.\* R. C. H. Heck. (64) Apr. 20.
- Electricity in Brickmaking.\* John A. Randolph. (76) Apr. 20.
- Floor Space and Storage in the Small Shop. John H. Van Deventer. (72) Serial beginning Apr. 22.
- Automobiles *versus* Horses in Road-Work Supervision. E. W. James. (13) Apr. 22.
- Valuable Products Recovered from Coke Oven Gases, Gary, Indiana.\* (46) Apr. 24.
- Diesel-Engine Central Station at Winchester, Ind.\* Thomas Wilson. (64) Apr. 27.
- The Ridgway Steam Turbine.\* (64) Apr. 27.
- Heat-Treating Equipment and Methods for Mass Production.\* E. A. Suverkrop. (72) Apr. 29.
- Kublerschky System of Tar Distillation.\* C. H. Borrmann (Translated from the German.) (83) May 1.
- The Motor Truck in Modern Military Service.\* (19) May 1.
- Régénérateurs et Récupérateurs. M. Stein. (93) Nov., 1914.
- Grue Derrick à Vapeur de 62 Tonnes du Port de Valparaiso (Chili).\* (33) Apr. 10.
- Bau und Betrieb eines modernen Glessereirohisenmischers.\* Oskar Simmersbach. (50) Mar. 25.
- Die Wärmeausnutzung neuerer Dampfkraftwerke und ihre Ueberwachung.\* M. Guillaume. (48) Serial beginning Mar. 27.
- Die Verbrennungsmotoren in der Gruppe 32 an der Schweiz. Landesausstellung, Bern 1914.\* P. Ostertag. (107) Serial beginning Apr. 3.

**Metallurgical.**

- Report of Committee B-2, Am. Soc. for Testing Materials, on Non-Ferrous Metals and Alloys. (89) Vol. 14, Pt. 1.
- Report of Committee A-4, Am. Soc. for Testing Materials, on Heat Treatment of Iron and Steel. (89) Vol. 14, Pt. 1.
- Method of Sampling and Analysis of Tin, Terne, and Lead-Coated Sheets.\* J. A. Aupperle. (89) Vol. 14, Pt. 2.
- The Trend of Modern Blast Furnace Construction.\* A. E. Maccoun. (58) Jan.
- Some Appliances for Metallographic Research. Walter Rosenbalm. (Paper read before the Inst. of Metals.) (47) Serial beginning Mar. 26.
- Modern Steels and Their Heat Treatment.\* Robert R. Abbott. (3) Apr.
- Iron a Factor in the World's Progress.\* John Birkinbine. (3) Apr.
- Stocking and Charging at Merchant Unit.\* Charles C. Lynde. (62) Apr. 1.
- Electric Steel-Making Furnaces.\* T. D. Robertson. (77) Apr. 1.
- The Turbo-Blower for the Blast Furnace.\* F. G. Cutler. (Abstract from paper read before the Am. Iron and Steel Inst.) (22) Apr. 2.
- The Constitution of the Alloys of Copper with Tin.\* John L. Haughton. (Paper read before the Inst. of Metals.) (11) Apr. 9.

\* Illustrated.



**Metallurgical—(Continued).**

- Copper Smelting in the Caucasus.\* (16) Apr. 10.  
 Automatic Skip Hoist at Morenci Mill.\* H. L. Hall. (82) Apr. 10.  
 Some Experiments Upon Copper Aluminum Alloys.\* J. H. Andrew. (Paper read before the Inst. of Metals.) (11) Apr. 16.  
 Tendency of American Milling Machinery Practice. Julius I. Wile. (16) Apr. 17.  
 Mine and Smelter of the United Verde Copper Company.\* C. A. Tupper. (82) Apr. 17.  
 The Alaska Gastineau Mill.\* L. E. Spray. (103) Apr. 17.  
 Extracting Copper with Ammonia.\* C. H. Benedict. (103) Apr. 17.  
 New Anaconda Leaching and Acid Plants.\* E. P. Mathewson. (16) Apr. 24.  
 The Crushing Plant of the Ohio Copper Co.'s Mills.\* Robert S. Lewis. (16) Apr. 24.  
 Development of Ore Concentration.\* Henry A. Marvin. (9) May.  
 Recent Rand Metallurgical Practice. M. Thornton Murray. (16) May 1.  
 Metallisches Kupfer aus einem Eisenhochofen.\* W. Heike. (50) Mar. 25.

**Military.**

- Technique des Installations Sanitaires Improvisées en Temps de Guerre.\* Paul Razous. (33) Mar. 27.  
 La Fabrication des Conserves de Viande pour le Ravitaillement du Camp Retranché de Paris.\* H. Copaux et André Kling. (33) Serial beginning Apr. 3.

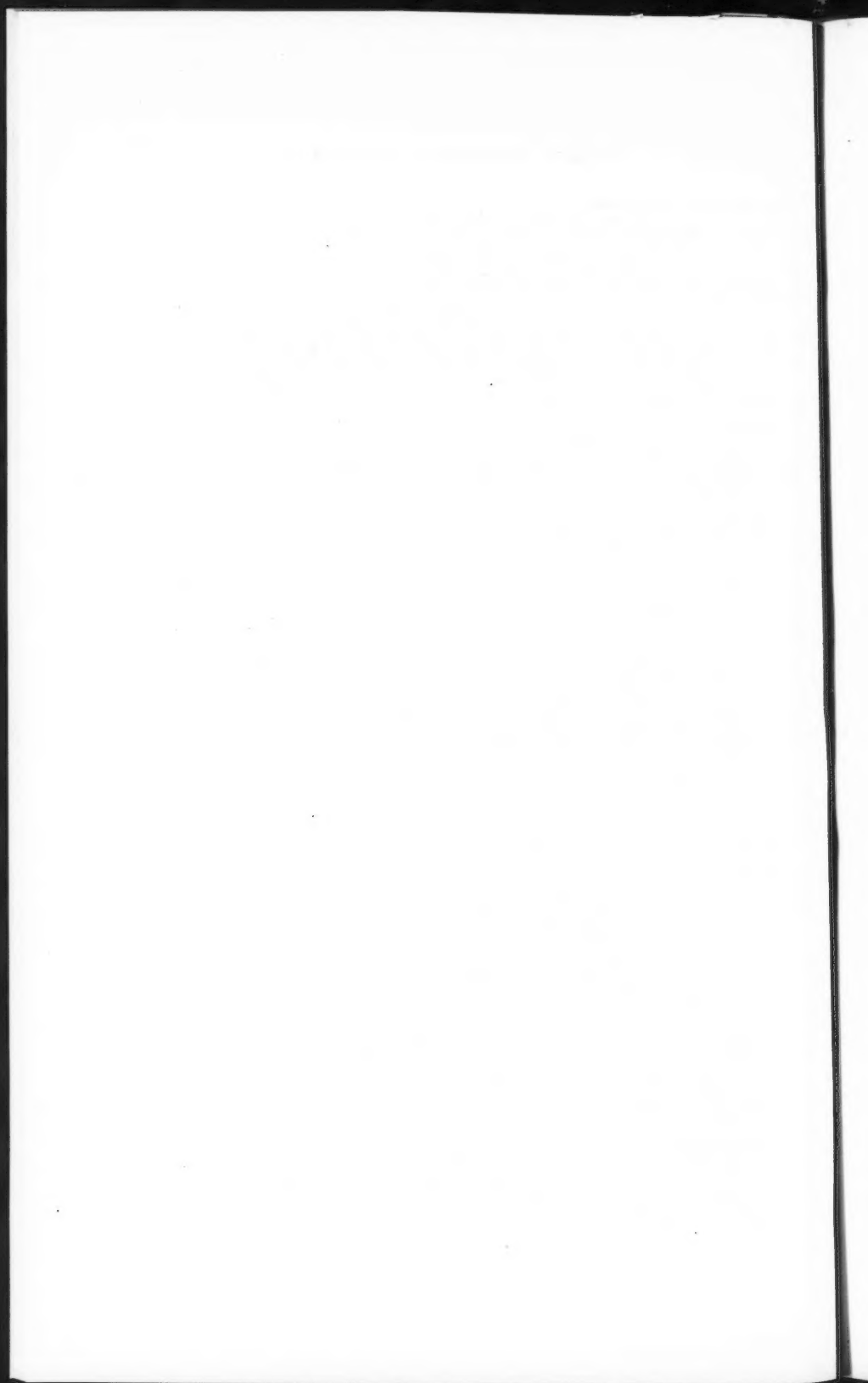
**Mining.**

- Notes on the Sixth and Final Report of the Explosions in Mines Committee. James Ashworth. (Paper read before the South Staffordshire and Warwickshire Inst. of Min. Engrs.) (106) Vol. 48, Pt. 4.  
 Notes on Timbering in Mines. John Gerrard. (Paper read before the South Staffordshire and Warwickshire Inst. of Min. Engrs.) (106) Vol. 48, Pt. 4.  
 The Design and Equipment of Colliery Electric-Lamp Rooms.\* William Maurice. (Paper read before the North Staffordshire Inst. of Min. and Mech. Engrs.) (106) Vol. 48, Pt. 4.  
 Self-Contained Rescue-Apparatus and Smoke-Helmets; Second Report to the Doncaster Coal-Owners (Gob-Fire Research) Committee. J. S. Haldane. (Paper read before the Institution of Min. Engrs.) (106) Vol. 48, Pt. 4.  
 The Lateral Friction of Winding-Ropes.\* H. W. G. Halbaum. (Paper read before the North of England Inst. of Min. and Mech. Engrs.) (106) Vol. 49, Pt. 1.  
 The Nature of Explosions. Harold B. Dixon. (Paper read before the North Staffordshire Inst. of Min. and Mech. Engrs.) (106) Vol. 49, Pt. 1.  
 Winding-Engine Signals.\* Wilfrid H. Davis. (Paper read before the North of England Inst. of Min. and Mech. Engrs.) (106) Vol. 49, Pt. 1.  
 The Reduction of Working-Costs at the Coal-Face. S. H. Cashmore. (Paper read before the North Staffordshire and Warwickshire Inst. of Min. Engrs.) (106) Vol. 49, Pt. 1.  
 Steel Roof Supports for Collieries.\* David Evans. (Paper read before the National Assoc. of Colliery Managers.) (22) Apr. 2.  
 What Mine Supplies Should Cost. B. J. Silbert. (103) Apr. 3.  
 Hydro-Electric Plant of the Cerro de Pasco Mining Co., Peru.\* Guillermo Hartmann. (82) Apr. 3.  
 Mining Nitrates in Chile.\* John G. Beck. (103) Apr. 3.  
 Electric Winding in South Africa.\* J. H. Rider. (57) Apr. 16.  
 Mining in the Caucasus Mountains.\* L. C. David. (16) Apr. 17.  
 Gold Dredging in the Philippines.\* William Kane. (From the *Philippine Journal of Science*.) (16) Apr. 17.  
 Types of Chutes and Chute Gates.\* Albert E. Hall. (16) Apr. 24.  
 Drills and Drill Bit Wrinkles, Record of Experience with Various Types.\* Chas. A. Hirschberg. (82) Apr. 24.  
 Hydraulic Mining at Atlin.\* A. D. Hughes. (103) Apr. 24.  
 Multiple-Arch Dam to Retain Quartz Mill Tailings.\* (13) Apr. 29.  
 The Layland, W. Va., Mine Disaster.\* (45) May.  
 Operations in the New River Field.\* William Z. Price. (45) May.  
 Mining in the Broad Top Coal Field.\* William Z. Price. (45) May.  
 Yakataga Beach Placers.\* Arthur G. Thompson. (16) May 1.  
 Locked Signal System (New Jersey Zinc Co.).\* H. H. Hodgkinson. (16) May 1.  
 Mining Low-Grade Copper Ore by Ray Consolidated.\* Alec N. Penny. (16) May 1.  
 Lavoir Central à Charbon. (33) Mar. 27.  
 Perforatrices Pneumatiques de Construction américaine.\* (33) Serial beginning Apr. 10.

**Miscellaneous.**

- Specifications and Tests of Glue.\* Oscar Linder and E. C. Frost. (89) Vol. 14, Pt. 2.  
 Possibilities in Technical Photography. Frederick Henius. (58) Jan.  
 A Modern 150-Ton Scale.\* (87) Jan.  
 Methods of Instruction in Engineering Extension. Kenneth G. Smith. (4) Mar.

\* Illustrated.



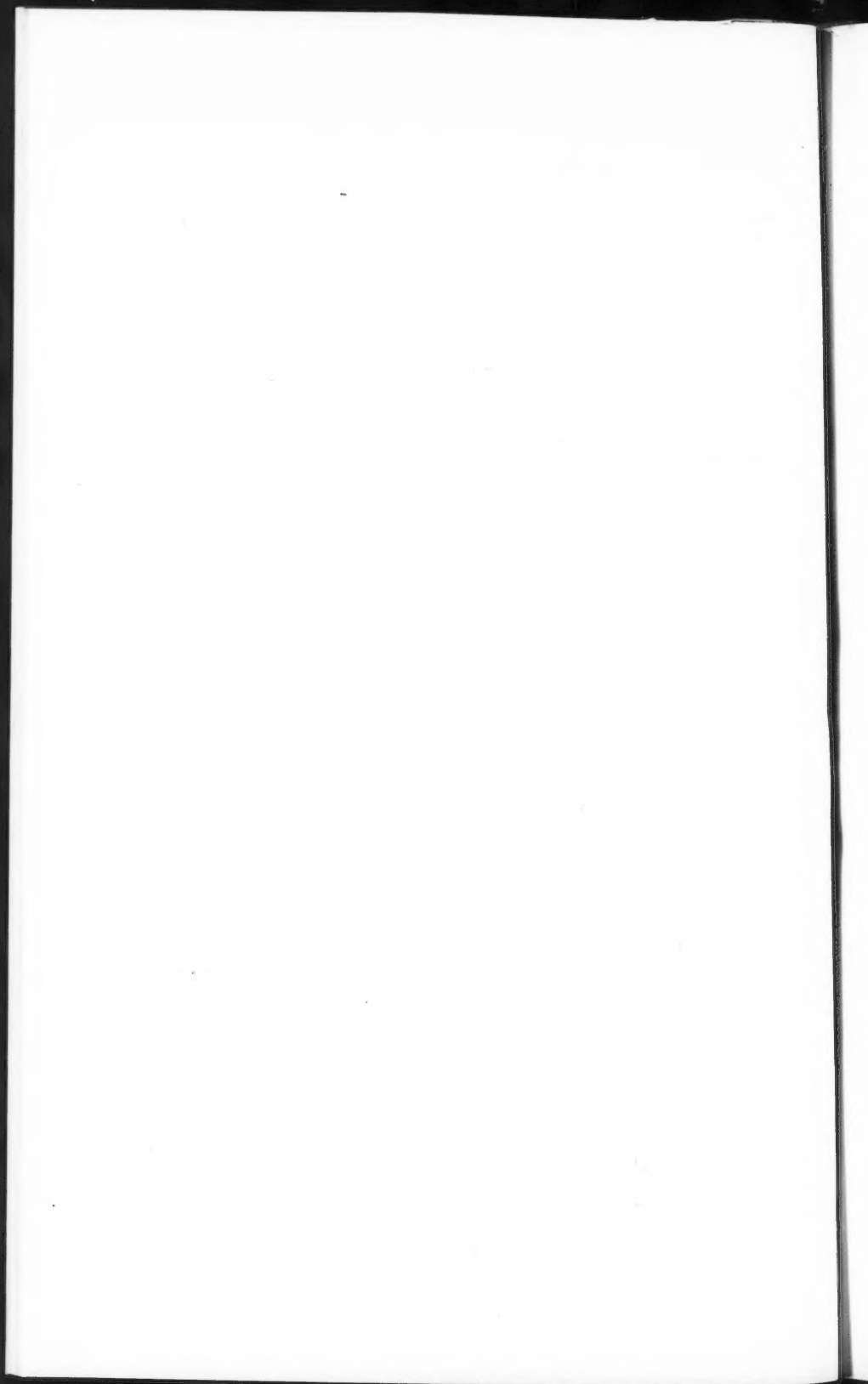
**Miscellaneous—(Continued).**

- The Specific Heat and Heat of Fusion of Ice. H. C. Dickinson and N. S. Osborne. (3) Apr.  
 Cost Keeping and Management. Fred Asa Barnes. (36) Apr.  
 The Duties and Sphere of Action of a Local Engineering Society with Special Reference to the Boston Society of Civil Engineers. Harrison P. Eddy. (109) Apr.  
 Infusorial Earth.\* Samuel H. Dolbear. (103) Apr. 10.  
 Training for the Industrial Side of Engineering. A. P. M. Fleming. (77) Apr. 15.  
 Factors Involved in Establishing Service Charge and Rate of Return of Public Utilities. O. E. Norman. (Paper read before the Illinois Gas Assoc.) (24) Apr. 26.  
 Methods of Approximate Integration. Willis Whited. (13) Apr. 29.  
 The National Bureau of Standards and Standards for Public Utilities. Herbert T. Wade. (9) May.  
 Misleading Boring Records are Grounds for Recovery of Damages by Contractors. (14) May 1.

**Municipal.**

- Proposed Standard Definitions of Terms Applicable to Materials Relating to Roads and Pavements. (Am. Soc. for Testing Materials.) (89) Vol. 14, Pt. 1.  
 Proposed Provisional Method for Making a Mechanical Analysis of Broken Stone or Broken Slag. (Am. Soc. for Testing Materials.) (89) Vol. 14, Pt. 1.  
 Proposed Standard Definitions of Terms Applicable to Materials Relating to Roads and Pavements. (Am. Soc. for Testing Materials.) (89) Vol. 14, Pt. 1.  
 Report of Committee D-4, Am. Soc. for Testing Materials, on Standard Tests for Road Materials. (89) Vol. 14, Pt. 1.  
 Methods for Determining the Melting Points of Asphalts. J. G. Miller and P. P. Sharples. (89) Vol. 14, Pt. 2.  
 Town Roads. Walter F. Wilson. (36) Mar.  
 Road Drainage. M. J. Adams. (36) Mar.  
 Surveys and Plans for Road Work. Mark W. Nelson. (36) Mar.  
 Gravel Roads. L. I. Hewes. (36) Mar.  
 Public Borrowing for Road Building. A. A. Young. (36) Mar.  
 Road Materials Available in New York State and Their Adaptability for Different Types of Construction. H. S. Mattimore. (36) Mar.  
 Asphalt Block Pavement.\* Geo. F. Hemstreet. (36) Mar.  
 The Mining and Refining of Lake Asphalt and the Physical and Chemical Characteristics of Asphalts for Paving Purposes. J. S. Miller. (36) Mar.  
 Surface Treatments and Bituminous Construction. Howard E. Smith. (36) Mar.  
 Prospecting for Road Material. Heinrich Ries. (36) Mar.  
 Standard Recommended Practices for Construction of Concrete Roads.\* H. E. Hilts. (36) Mar.  
 Cost and Economy of Cement Concrete Pavements. H. E. Hilts. (36) Mar.  
 Sand Clay Roads. L. I. Hewes. (36) Mar.  
 Wire-Cut-Lug Paving Brick.\* Wm. C. Perkins, M. Am. Soc. C. E. (Paper read before the Ohio Eng. Soc.) (60) Apr.  
 Road and Boulevard Construction in Philadelphia, Pa.\* (60) Apr.  
 Construction of Brick Pavements. Will P. Blair. (36) Apr.  
 Manufacture and Inspection of Paving Brick. Will P. Blair. (36) Apr.  
 Experimental Concrete Roads. James T. Voshell. (67) Apr.  
 The Organization, Character of Personnel, Scope of Work, and Methods of Operation and Control of a Large Municipal Highway Department.\* William H. Connell. (3) Apr.  
 Proper Construction of Brick Pavements. Wm. C. Perkins. (36) Apr.  
 Extraordinary Traffic. D. M. Jenkins. (Paper read before the Institution of Mun. and County Engrs.) (104) Apr. 2.  
 Bituminous Concrete Pavement Construction in Washington, D. C.\* Mark Brooke. (86) Apr. 7.  
 Methods and Costs of Building a Macadam Road Using an Industrial Railway.\* R. P. Mason. (86) Apr. 7.  
 A Factory City Beautiful at Low Cost.\* (20) Apr. 8.  
 Reducing the Cost of Brick Roads in Illinois. H. E. Bilger. (Abstract of paper read before the Ill. Soc. of Engrs. and Survs.) (13) Apr. 8.  
 The Jitney Bus, Huston and Salt Lake City Regulatory Ordinances Passed, San Francisco Ordinance Introduced Additional City Reports. (17) Apr. 10.  
 Misuse of a Good Paving Material is Detrimental to Florida Road Development.\* Charles E. Foote. (14) Apr. 10.  
 Method of Assessing the Cost of Street Improvement in Two Iowa Cities.\* M. G. Hall. (Paper read before the Iowa Soc. of Engrs.) (86) Apr. 14.  
 Methods and Cost of Constructing a Mountain Road System in Wise County, Virginia.\* Wm. F. Cocke. (86) Apr. 14.  
 Creosoted Wood Block Pavements. Andrew F. Macallum. (Paper read before the Canadian and International Good Roads Convention.) (96) Apr. 15.  
 Methods and Costs of Moving Earth in Southern Road Construction. N. C. Hughes, Jr. (13) Apr. 15.

\* Illustrated.





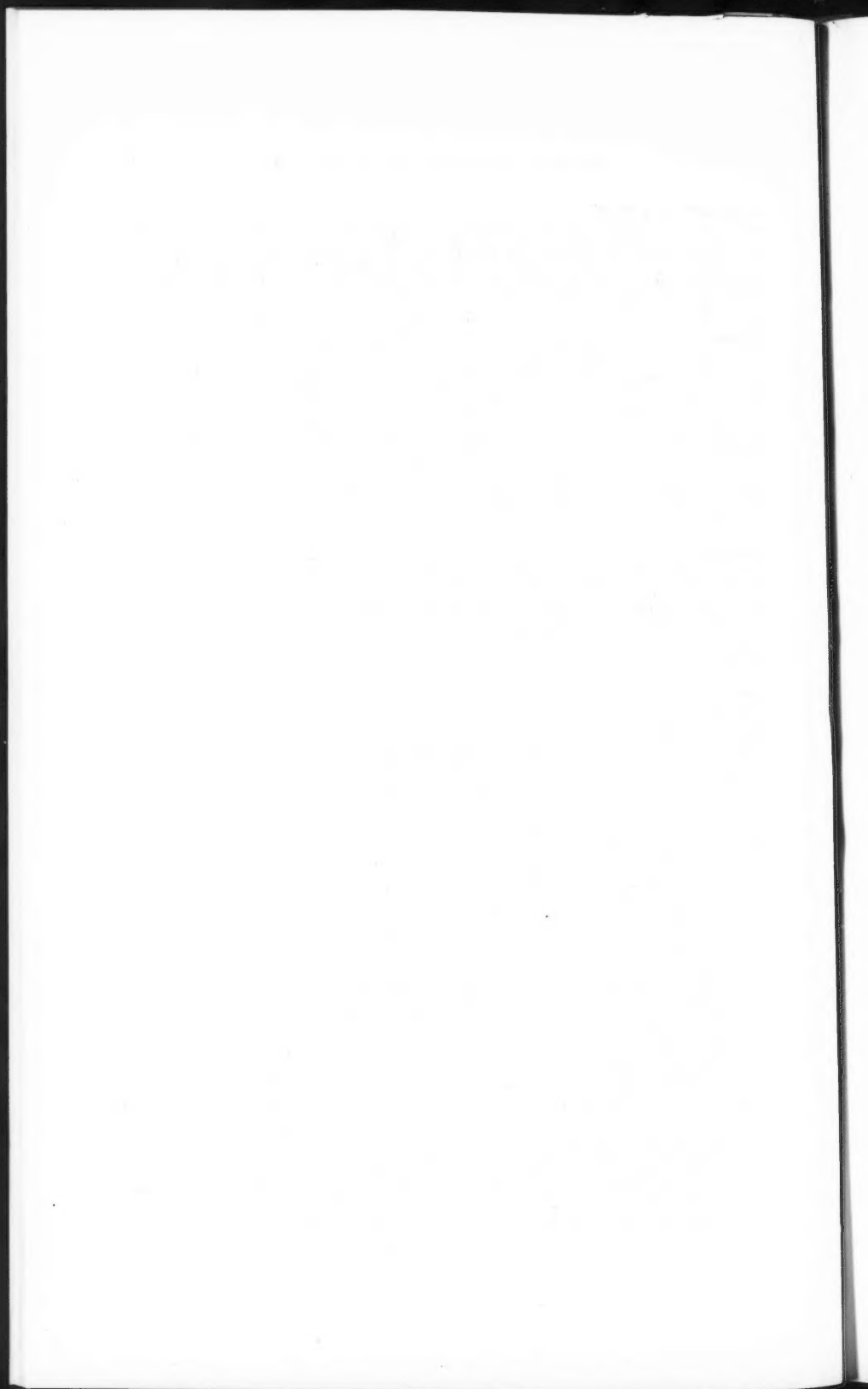
**Municipal—(Continued).**

- The Low Cost Road. Phillip P. Sharples. (Paper read before the Road Convention at the Manitoba Agricultural College.) (96) Apr. 15.
- Main Roads Past and Present and Modern Methods of Construction and Maintenance.\* Frank Grove. (Paper read before the Soc. of Engrs.) (104) Apr. 16.
- State-Wide Survey Locates Road-Making Materials in New York.\* (14) Apr. 17.
- Concrete Road with a Single Crack in  $4\frac{1}{4}$  Miles the Result of Careful Construction.\* (14) Apr. 17.
- Street Contours at Intersections and Crosswalks.\* (13) Apr. 22.
- Specifications for the Application of Resurfacing Asphalt Binder. (13) Apr. 22.
- Wearing Surfaces. Geo. W. Tillson. (Paper read before the Internat. Good Roads Convention.) (96) Apr. 22.
- Five Years' Experience with Concrete Pavements at Fredonia, Kansas.\* (14) Apr. 24.
- Motor Truck Reduces Sprinkling Cost 70 Per Cent.; Earth and Gravel Roads in Chelan County, Washington, Watered at Expense of 30 Cents a Mile as Against \$1 a Mile with Teams. (14) Apr. 24.
- A Proposed Construction to Reduce the Cost of Brick Roads. (86) Apr. 28.
- Methods of Constructing and Maintaining Gravel Roads. A. H. Hinkle. (Paper read before the Ohio State Highway Dept.) (86) Apr. 28.
- Care of Country Roads. Hiram Donkin. (96) Apr. 29.
- Concrete Pavements with Dished Surfaces.\* (14) May 1.
- Kansas City Tries Thin Brick with Sand-Asphalt Surface. Clark R. Mandigo. (14) May 1.

**Railroads.**

- Notes on Chilled Cast Iron (for Car Wheels).\* E. B. Tilt. (89) Vol. 14, Pt. 2.
- A Failed Axle; Study of an Internal Transverse Fissure.\* Robert Job. (89) Vol. 14, Pt. 2.
- Magnolia Cut-Off Improvement on the Baltimore and Ohio Railroad.\* A. W. Thompson. (58) Dec. 1914.
- Interesting Installation of Block Signals on a Single Track Trunk Line.\* (87) Jan.
- Single Track Automatic Block Signals.\* (87) Feb.
- Mechanical Life of Ties as Affected by Ballast. E. Stimson. (Paper read before the Am. Wood Preservers' Assoc.) (87) Feb.
- The Value of a Locomotive. G. S. Goodwin. (61) Feb. 16.
- Rating for Load Capacity of Track Scales.\* W. Samans. (87) Mar.
- Retaining Walls on Soft Foundations.\* Walter S. Lacher. (4) Mar.
- Economies in Power Consumption in Electric Railways.\* N. W. Storer. (4) Mar.
- The Creosoting of Cross Ties as Practiced by American Railroads.\* A. C. Steinmayer. (Paper read before the Engrs' Club of St. Louis.) (1) Mar.
- Electric Interlocking Plant at Aulon, Tennessee.\* (87) Mar.; (15) Apr. 30.
- The Primary Cause of Rail Breakage. H. C. Saunders. (87) Mar.
- 4-8-0 Type Locomotive, Benguela Railway.\* (23) Mar. 26.
- The Elimination of Grade Crossings. L. Bayles Reilly. (109) Apr.
- Discussion on Electrification before the New York Railroad Club. (65) Apr.
- Fundamental Characteristics of Signal Lenses.\* (87) Apr.
- Modern Locomotive Engine Design and Construction. (21) Serial beginning Apr.
- 4-6-0 Type Locomotives, Buenos Ayres Great Southern Railway.\* (23) Apr. 2.
- North-Western Railway (India) Ambulance Trains.\* (23) Apr. 2.
- Locomotive Coaling Plant at Camden Town.\* (12) Apr. 2.
- 2-8-0 Locomotive for the Italian State Railways.\* (11) Serial beginning Apr. 2.
- Santa Fé Type Locomotive for the Erie R. R.\* (18) Apr. 3.
- Steel Dynamo-Baggage Cars for the Union Pacific R. R.\* (18) Apr. 3.
- Experiments to Determine the Forces Imposed on a Truck Side Frame and the Stresses Produced.\* L. E. Endsley. (Paper read before the Ry. Club of Pittsburgh.) (18) Serial beginning Apr. 3.
- New Standard Sections for Heavy Rails.\* (13) Apr. 8.
- Simple Pacific Type Locomotive for the Santa Fé.\* (15) Apr. 9.
- Pacific Type Locomotives for the Union Pacific.\* (15) Apr. 9.
- Reconstruction of the Jersey City Terminal Yards.\* (15) Apr. 9.
- British Ambulance Vehicles.\* (23) Apr. 9.
- Position Light Signals on the Pennsylvania R. R.\* (18) Apr. 10.
- Chief Engineers Discuss Grade-Crossing Law and Cost Distribution. (14) Apr. 10.
- Tunnel Waterproofing with Cement-and-Clay Mortar. (13) Apr. 15.
- Chapel Cars for Church Extension Work.\* (15) Apr. 16.
- Test of a Mountain Type Locomotive on the Rock Island.\* W. J. Tollerton. (15) Apr. 16.
- Concrete Work on the Arizona Division of the Santa Fé.\* (15) Apr. 16.
- South African Railway Locomotives.\* (23) Apr. 16.
- The U. S. Government's Alaskan Railway.\* (18) Apr. 17.
- One Large Building Houses All Departments of Locomotive Repair Shops; Innovation in the Additional Facilities Provided for the Chicago & Alton Railroad at Bloomington, Illinois.\* (14) Apr. 17.
- High Concrete Retaining Wall with Structural Reinforcing.\* (13) Apr. 22.

\* Illustrated.



**Railroads—(Continued).**

- Switching Locomotives Driven by Gasoline Engine Power.\* (13) Apr. 22.  
 Material Removal in Tunneling. D. W. Brunton and J. A. Davis. (From Report to the U. S. Bureau of Mines.) (96) Apr. 22.  
 Automatic Block Signals on the Western Maryland.\* (15) Apr. 23.  
 Mikado Locomotives for the Georgia R. R.\* (18) Apr. 24.  
 Repair-Shop Procedure at Milwaukee.\* (17) Apr. 24.  
 Operating Shay Locomotives.\* Frank M. Leland. (16) Apr. 24.  
 Elements of Railroad Value that Might be Overlooked; Valuation Committee of Cincinnati, Hamilton & Dayton Railway Issues Bulletin Listing Sixty-Two Such Items. (14) Apr. 24.  
 Mountain Incline at Hamilton, Ont.\* (96) Apr. 29.  
 The Use of Pulverized Fuel for Locomotives.\* (15) Apr. 30.  
 Public Regulation of Wages of Railway Employees. Frank Haigh Dixon. (Paper read before the American Economic Assoc.) (15) Apr. 30.  
 Cost Accounting in the Railroad Repair Shop. Ernest Cordeal. (9) May.  
 The Vienna-Pressburg Single-Phase Railway.\* (17) May 1.  
 New Canada-New England Railroad Link Completed, Van Buren Bridge Route from Northern Maine to New Brunswick.\* (14) May 1.  
 La Construction du Second Tunnel du Simplon dans la Zone des Fortes Pressions.\* (33) Apr. 3.  
 Versuche über die Bewehrung von Winkelstützmauern.\* L. Lillienfeld. (51) Sup. No. 7.  
 Der Lokomoter, eine neue Rangiermaschine.\* J. Fried. (53) Mar. 19.  
 Der Adhäsionsgewicht elektrischer Fahrzeuge bei Motoren verschiedener Stromart. W. Kummer. (107) Mar. 20.  
 Die Tunnel-Lüftanlagen der Tauern-Bahn.\* Rudolf Schumann. (48) Serial beginning Mar. 27.

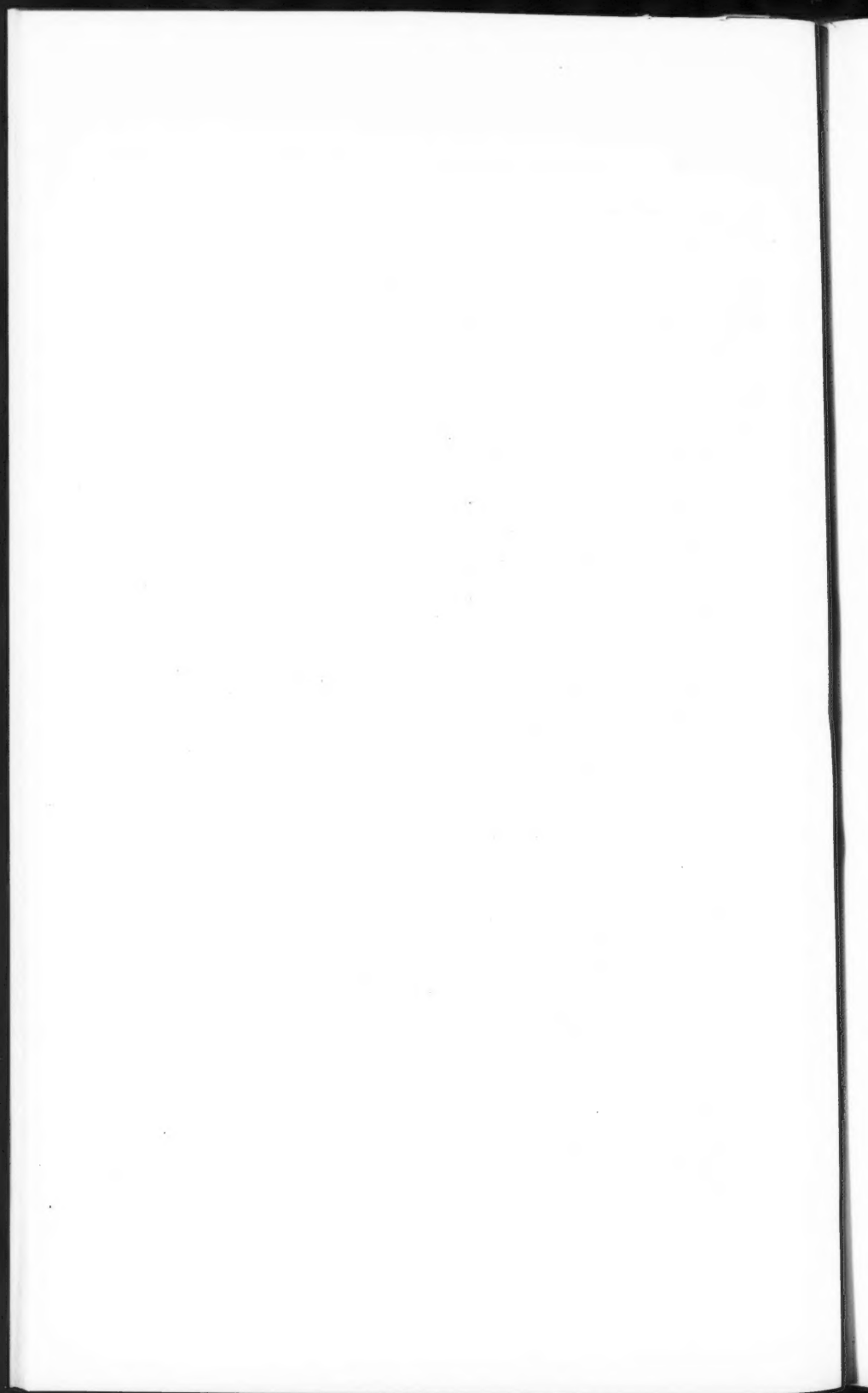
**Railroads, Street.**

- Comparative Economics of Tramways and Railless Electric Traction.\* Theodore Graham Gribble. (63) Vol. 198.  
 A Carhouse for a Residential District.\* (17) Apr. 3.  
 Track Concreting Costs Vary with Mixing Methods. S. Gausmann. (14) Apr. 10.  
 Short Subway Section in New York Involves Many Difficulties of Design.\* Julius Glaser. (14) Apr. 10.  
 The Simplex Rail Coach.\* (12) Apr. 16.  
 Enlargement of New York Interborough Station.\* (27) Apr. 17.  
 Interborough Power Plant Enlargement.\* (17) Apr. 17.  
 Seventy-Fourth Street Station and Its New Cross-Compound Turbines.\* Charles H. Bromley. (64) Apr. 20.  
 Unexcavated Core is Left in Center in Sinking Circular Subway Shaft.\* (14) Apr. 24.  
 Zone Fares in Milwaukee.\* R. B. Stearns. (Paper read before the New England Street Railway Club.) (17) May 1.  
 New Cars for Kansas City.\* (17) May 1.  
 Betrachtungen über die wirtschaftlichsten Abmessungen der Leitungsanlage und die vorteilhaftesten Entfernungen der Unterwerke für städtische Schnellbahnen.\* W. Bethge. (41) Apr. 1.

**Sanitation.**

- Report of Committee C-6, Am. Soc. for Testing Materials, on Standard Tests and Specifications for Drain Tile. (89) Vol. 14, Pt. 1.  
 Report of Committee C-4, Am. Soc. for Testing Materials, on Standard Specifications and Tests for Clay and Cement Sewer Pipes. (89) Vol. 14, Pt. 1.  
 Round Table Discussion of Filler and Drainage. (36) Mar.  
 Road Drainage. M. J. Adams. (36) Mar.  
 Observations of Some European Water Purification and Sewage Disposal Plants.\* Edward Bartow. (59) Mar.  
 Fairview Sewage-Pumping Station.\* Thomas Wilson. (64) Mar. 2.  
 Improvement of Pogue's Run, Indianapolis, Indiana.\* (60) Apr.  
 Royal Commission on Sewage Disposal Issue of Ninth and Final Reports. (104) Serial beginning Apr. 2.  
 Heating and Ventilating System of American Cigar Co.'s Plant. W. L. Durand. (64) Apr. 6.  
 Sewage Collection and Pumping Systems on Low-Lying Park Point near Duluth, Minn.\* (86) Apr. 7.  
 Street Cleaning at Springfield, Ohio, with Motor Driven Apparatus. George L. Rinkliff. (86) Apr. 7.  
 Segmental Sewer Blocks.\* (96) Apr. 8.  
 Reinforcing a Vitrified-Pipe Sewer at Passaic, N. J.\* S. J. Naughton. (13) Apr. 8.  
 All-Steel Refuse Incinerator, Roanoke, Va.\* J. C. Woodman. (13) Apr. 8.  
 Following Explosion, Boston Sewer Tests Show no Gasoline. (14) Apr. 10.

\* Illustrated.



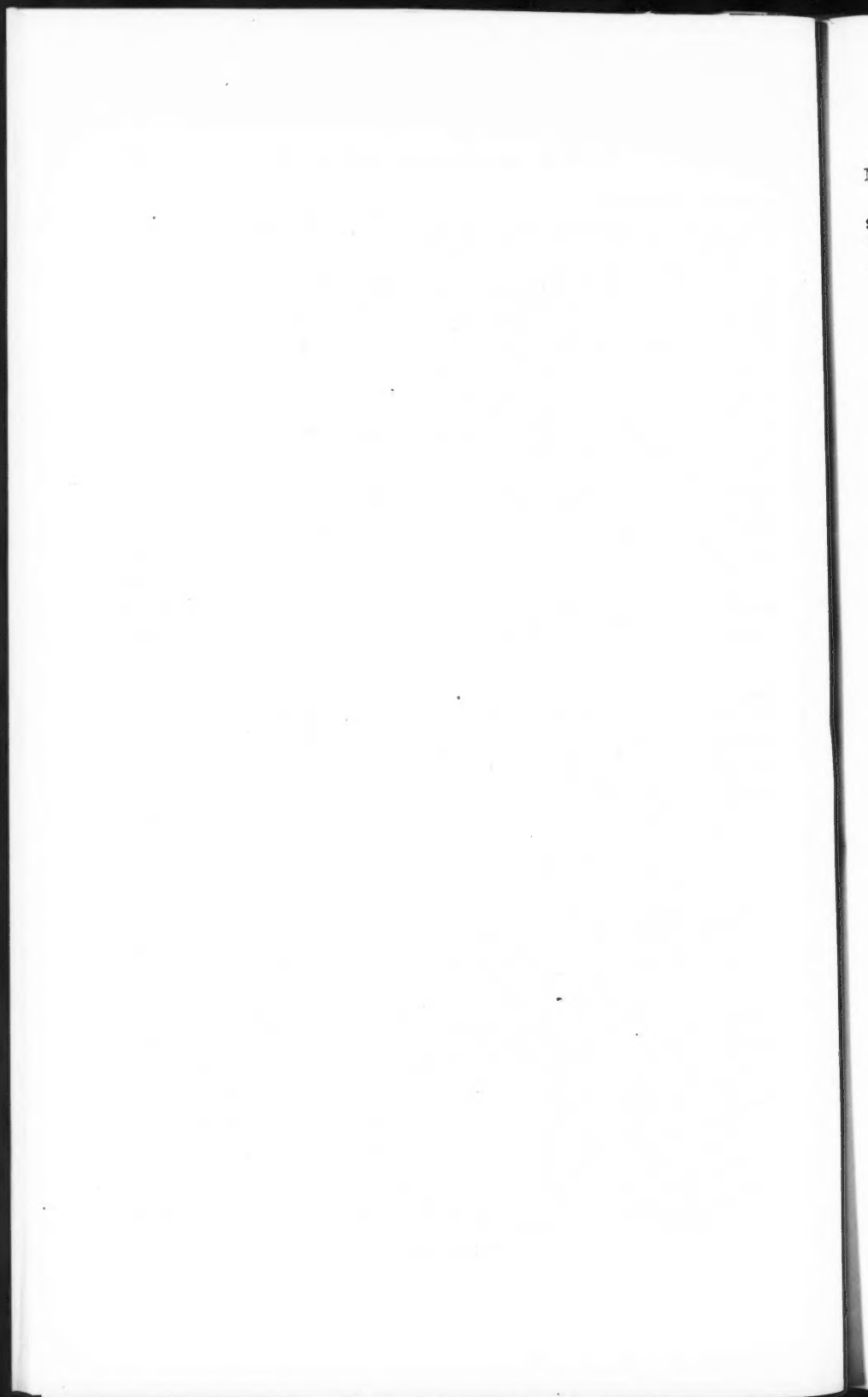
**Sanitation—(Continued).**

- First Section of Sacramento Trunk Sewer Completed. (14) Apr. 10.  
 A Bolometric Method of Determining the Efficiencies of Radiating Bodies. William A. Bone, H. L. Callendar, and H. James Yates. (Paper read before the Royal Soc.) (66) Apr. 13.  
 A Cape Town Bathing Pavillion.\* A. N. Henderson. (104) Apr. 16.  
 Small Public Bath House in Kentucky City.\* (101) Apr. 16.  
 Decatur Installs Plant for Sewage Tests.\* (14) Apr. 17.  
 Low River Flow Exacting for Columbus Sewage Works.\* (14) Apr. 17.  
 Processes Available for the Treatment of Industrial Wastes. (86) Apr. 21.  
 Construction Plant and Methods Employed in Building a System of Tunnel Sewers at Edmonton, Alberta.\* (86) Apr. 21.  
 Imhoff Sewage Tank at Manchester, England.\* Oswald J. Wilkinson. (13) Apr. 22.  
 Engineering Data for Furnace Heating. Arthur C. Willard. (Paper read before the Midland Club.) (101) Apr. 23.  
 Co-Operation Sought in Conducting Activated Sludge Experiments at Baltimore. Leslie C. Frank and Calvin W. Hendrick. (14) Apr. 24.  
 Simple and Efficient Recording Gage for Weir Measurements (Sewage).\* (13) Apr. 29.  
 Municipal Garbage-Reduction Plant, Schenectady, N. Y.\* S. Gertz. (13) Apr. 29.  
 Construction of a 6-ft. Segmental-Block Sewer.\* Benjamin Wilk. (13) Apr. 29.  
 Chicago Ventilation Commission First Report.\* (101) Apr. 30.  
 Construction and Operation of Septic Tanks. W. H. Chapman. (Paper read before the Michigan State Assoc. of Master Plumbers.) (101) Apr. 30.  
 Indianapolis Builds Million Dollar Storm-Water Drain under Railroad Yards: Huge Double-Box Section, Preliminary to Track Elevation, Constructed by Movable Concrete Outfits Operating at Both Ends of the Work.\* (14) May 1.  
 Abwasserreinigung und Klärschlammabeseitigung bei Hochofenwerken. Emil Opderbeck. (50) Serial beginning Mar. 18.  
 Benutzung von Eisenbetonhohlsäulen zu Heizungs- und Lüftungszwecken.\* Frank C. Perkins. (78) Apr. 1.

**Structural.**

- Proposed Provisional Test for the Determination of the Absorption of Water per Cubic Foot of Rock. (Am. Soc. for Testing Materials.) (89) Vol. 14, Pt. 1.  
 Proposed Revisions in Present Standard Specifications for Steel and Steel Products. (Am. Soc. for Testing Materials.) (89) Vol. 14, Pt. 1.  
 Proposed Standard Definitions of Terms Used in Paint Specifications. (Am. Soc. for Testing Materials.) (89) Vol. 14, Pt. 1.  
 Tentative Specifications for Quicklime. (Am. Soc. for Testing Materials.) (89) Vol. 14, Pt. 1.  
 Tentative Specifications for Hydrated Lime. (Am. Soc. for Testing Materials.) (89) Vol. 14, Pt. 1.  
 Report of Committee A-1 (Am. Soc. for Testing Materials) on Standard Specifications for Steel. (89) Vol. 14, Pt. 1.  
 Tentative Specifications for Cold-Drawn Steel. (Am. Soc. for Testing Materials.) (89) Vol. 14, Pt. 1.  
 Report on Proof Tests of Finished Forgings Conducted Under the Direction of Sub-Committee 6 on Steel Forgings and Billets of Committee A-1.\* (Am. Soc. for Testing Materials.) (89) Vol. 14, Pt. 1.  
 Report on Permissible Variations in Weight and Gage of Sheared Plates Submitted by the Assoc. of Am. Steel Manufacturers at the Request of Committee A-1. (Am. Soc. for Testing Materials.) (89) Vol. 14, Pt. 1.  
 Report of Committee A-2 (Am. Soc. for Testing Materials) on Standard Specifications for Wrought Iron. (89) Vol. 14, Pt. 1.  
 Report of Committee A-3 (Am. Soc. for Testing Materials) on Standard Specifications for Cast Iron and Finished Castings. (89) Vol. 14, Pt. 1.  
 Report of Committee A-6 (Am. Soc. for Testing Materials) on Magnetic Testing of Iron and Steel.\* (89) Vol. 14, Pt. 1.  
 Report of Committee A-8 (Am. Soc. for Testing Materials) on Standard Specifications for Cold-Drawn Steel. (89) Vol. 14, Pt. 1.  
 Report of Committee C-1 (Am. Soc. for Testing Materials) on Standard Specifications for Cement. (89) Vol. 14, Pt. 1.  
 Report of Committee C-3 (Am. Soc. for Testing Materials) on Standard Specifications for Brick. (89) Vol. 14, Pt. 1.  
 Report of Committee C-7 (Am. Soc. for Testing Materials) on Standard Specifications for Lime. (89) Vol. 14, Pt. 1.  
 Report of Committee D-1 (Am. Soc. for Testing Materials) on Preservative Coatings for Structural Materials. (89) Vol. 14, Pt. 1.  
 Report of Sub-Committee 3 of Committee D-1 (Am. Soc. for Testing Materials) on Testing of Paint Vehicles. (89) Vol. 14, Pt. 1.

\* Illustrated.





**Structural—(Continued).**

- Report of Sub-Committee 8 of Committee D-1 (Am. Soc. for Testing Materials) on Methods of Analysis of Paint Materials. (89) Vol. 14, Pt. 1.
- Supplementary Report of Sub-Committee 5 of Committee D-1 (Am. Soc. for Testing Materials) on Density and Thermal Expansion of Linseed Oil. H. W. Bearce and E. L. Peffer. (89) Vol. 14, Pt. 1.
- Report of Sub-Committee 12 of Committee D-1 (Am. Soc. for Testing Materials) on Turpentine. (89) Vol. 14, Pt. 1.
- Proposed Specifications for Turpentine. (Am. Soc. for Testing Materials.) (89) Vol. 14, Pt. 1.
- Report of Committee D-7 (Am. Soc. for Testing Materials) on Standard Specifications for Timber. (89) Vol. 14, Pt. 1.
- Report of Committee E-1 (Am. Soc. for Testing Materials) on Standard Methods of Testing.\* (89) Vol. 14, Pt. 1.
- Proposed Provisional Test for the Determination of the Apparent Specific Gravity of Rock. (Am. Soc. for Testing Materials.) (89) Vol. 14, Pt. 1.
- Considerations Affecting Specifications for Wrought Non-Ferrous Materials.\* W. Reuben Webster. (89) Vol. 14, Pt. 2.
- An Improved Type of Axial Strainometer.\* Arthur C. Alvarez. (89) Vol. 14, Pt. 2.
- Paint Protection for Portland-Cement Surfaces.\* H. A. Gardner. (89) Vol. 14, Pt. 2.
- A Rational Test for Metallic Protective Coatings. J. A. Capp. (89) Vol. 14, Pt. 2.
- Quantitative Determination of Body and Solvent in Varnish. A. L. Brown. (89) Vol. 14, Pt. 2.
- Examination of Chinese Wood Oil. E. E. Ware and C. L. Schumann. (89) Vol. 14, Pt. 2.
- Report of a Permeability Test for Paints and Varnishes.\* A. M. Muckenfuss. (89) Vol. 14, Pt. 2.
- Strength of Lime Mortar. W. E. Emley and S. E. Young. (89) Vol. 14, Pt. 2.
- Examination of Concrete Failures for Their Determining Causes.\* R. S. Greenman. (89) Vol. 14, Pt. 2.
- Relation Between Deformation and Deflection in Reinforced-Concrete Beams.\* G. A. Maney. (89) Vol. 14, Pt. 2.
- Blast-Furnace Slag as Aggregate in Concrete. W. A. Aiken. (89) Vol. 14, Pt. 2.
- Testing Concrete Aggregates.\* Cloyd M. Chapman. (89) Vol. 14, Pt. 2.
- Proportioning Aggregates for Portland-Cement Concrete. Albert Moyer. (89) Vol. 14, Pt. 2.
- Additional Results Obtained with the Autoclave Test for Portland Cement.\* H. J. Force. (89) Vol. 14, Pt. 2.
- Volume Changes in Portland Cement and Concrete. A. H. White. (89) Vol. 14, Pt. 2.
- Errors in the Methods of Determining the Time of Setting of Cement.\* G. M. Williams. (89) Vol. 14, Pt. 2.
- The Use of Turned Sections in Tension Tests of Reinforcing Bars.\* E. P. Withrow and L. C. Niedner. (89) Vol. 14, Pt. 2.
- Hardness Tests: Relation Between Brinell Ball-Test and Scleroscope Readings.\* J. J. Thomas. (89) Vol. 14, Pt. 2.
- Study of the Strength of Non-Ferrous Castings; Comparison of Different Test Specimens.\* L. P. Webbert. (89) Vol. 14, Pt. 2.
- Are the Effects of Simple Overstrain Monotropic?\* Henry M. Howe. (89) Vol. 14, Pt. 2.
- Magnetic Habits of Alloy Steels. J. A. Mathews. (89) Vol. 14, Pt. 2.
- Masonry and Foundations. Henry S. Jacoby. (36) Mar.
- Reinforced Concrete in a Gas-Works.\* Thomas Carmichael. (Paper read before the Scottish Junior Gas Assoc.) (66) Mar. 23.
- Concrete Piles for the Foundations of Gasholders.\* F. E. Drake. (Paper read before the New England Gas Engrs. Assoc.) (66) Mar. 30.
- Sea Water and Cement Concrete. (21) Apr.
- Etching Reagents and Their Applications. O. F. Hudson. (Paper read before the Inst. of Metals.) (47) Serial beginning Apr. 2.
- Effects of Proportions on Density and Strength of Gravel Concrete.\* R. W. Crum. (Paper read before the Iowa Eng. Soc.) (86) Apr. 7.
- A Modern Small Sized Construction Camp with Some Costs on Feeding Men.\* E. W. Robinson. (86) Apr. 7.
- Steel Construction for the Schenley Theater, Pittsburgh.\* C. N. Haggart. (13) Apr. 8.
- Methods Pursued in Tearing Down a Large Building.\* Joseph Rosenzweig. (13) Apr. 8.
- Concrete-Unit Building Construction at Cedar Rapids.\* (13) Apr. 8.
- Large Brick Piers Tested at Laboratory of Bureau of Standards, Strength is Directly Affected by Kind of Brick and Quality of Mortar, but not by Various Methods of Course Bonding.\* (14) Apr. 10.
- Wet Concrete Hauled from Central Plant on River.\* (14) Apr. 10.
- Column Forms Hold 30 Feet of Wet Concrete.\* P. A. McGeady. (14) Apr. 10.

\* Illustrated.

M

St

Co

P

A

W

S

E

A

F

S

V

I

C

M

C

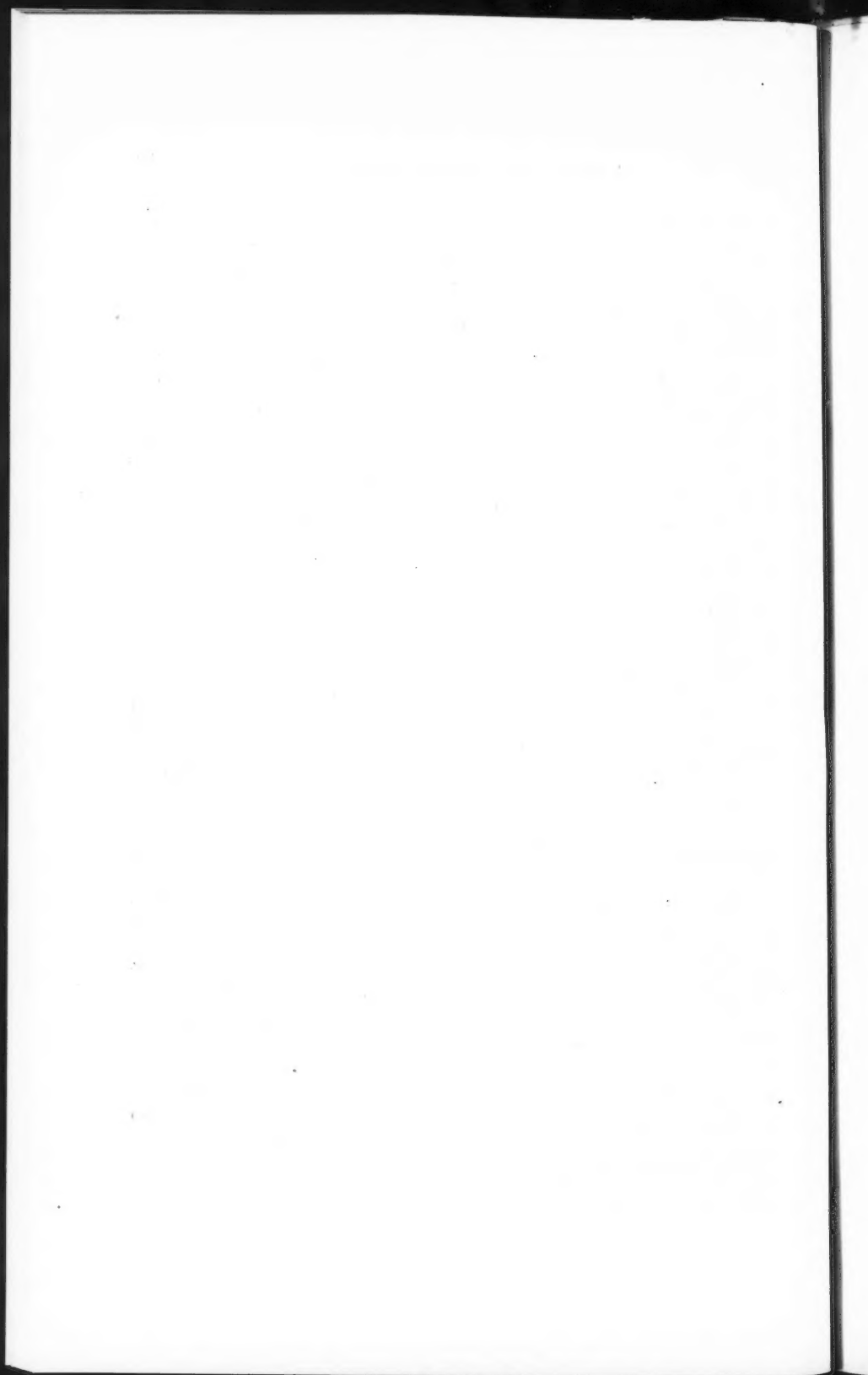
**Structural—(Continued).**

- Contract Time Limit Binding Despite Excessive Quantities. William B. King. (14) Apr. 10.
- Painting Steel to Prevent Electrolysis. (14) Apr. 10.
- A Comprehensive Set of Tables for Determining the Bending Moments and Shears in Simple Beams and in Beams Fixed at One and Both Ends.\* S. M. Cotten. (86) Apr. 14.
- Waterproofing Existing Concrete Structures. (13) Apr. 15.
- Special Features in Forms for Concrete Buildings.\* (13) Apr. 15.
- Building Reinforced-Concrete Steps without Forms.\* R. C. Hardman. (13) Apr. 15.
- A City Founded on Sawdust.\* (14) Apr. 17.
- Repair of Concrete Buildings at Edison Plant Sets Precedents in Construction Work.\* (14) Apr. 17.
- Shrinkage of Concrete and Conditions of Curing. F. R. McMillan. (14) Apr. 17.
- Weathering of Concrete Prevented by Waterproofing; the Reclamation Service Treats Vertical Surfaces with Soap and Alum and Horizontal Surfaces with Paraffine. (14) Apr. 17.
- Effect of Age and Curing on the Strength of Concrete.\* M. O. Withey. (From the *Wisconsin Engineer*.) (96) Apr. 22.
- Octagonal Framed Dome, San Francisco Auditorium.\* (13) Apr. 22.
- Long-Span Roof Slab of Concrete and Tile.\* Max Miller. (14) Apr. 24.
- Concrete Column Tests Disclose Effects of Longitudinal and Spiral Reinforcement; Tests Made for the American Concrete Institute Show Consistent Results for Variation of Strength with Percentage of Steel. (14) Apr. 24.
- Some Details of the Exterior Wooden Framing of the Tower of Jewels, Panama-Pacific International Exposition, San Francisco, Cal.\* (86) Apr. 28.
- General Practice in Sand Testing; Outfit and Methods Used in Denver Laboratory, Requirements for Acceptance by Board of Water Supply of New York. (14) May 1.
- Use of Six-Inch and Eight-Inch Aggregate Points to Economies in Concrete Work. Edward O. Keator. (14) May 1.
- Wind Wrecks 5-Story Wall Which Resisted Fire.\* (14) May 1.
- Étude Comparative sur les Essais au Choc Simple, les Essais aux Chocs Répétés, les Essais de Flexion Rotative, et les Essais de Flexion Alternée.\* M. Nusbaumer. (93) Nov., 1914.
- Le Nouveau Magasin à Blé de Glasgow.\* (33) Mar. 27.
- Les Phénomènes d'Éclatement et de Fragilité.\* Ch. Dantin. (33) Apr. 17.
- Die Eisenbetonarbeiten des neuen Verwaltungs-Gebäudes des Ortskrankenkasse zu Dresden.\* R. Wortmann und H. Marcus. (51) Serial beginning Sup. No. 7.
- Magnetische Prüfung von Eisenblech im Epsteinschen Apparat.\* J. Sumeč. (41) Apr. 1.
- Der Brand der Edison-Werke in West-Orange, N. J.\* Henne. (78) Apr. 1.
- Die Kriegs-Nospitäler der Stadt Wien.\* Heinrich Goldemund. (53) Serial beginning Apr. 2.
- Ueber Einflüsse des Drahtziehens auf die Eigenschaften von Flusseisendrähnen.\* Hermann Altpeter. (50) Apr. 8.

**Water Supply.**

- Viscosity Measurement and a New Viscosimeter. Alan E. Flowers. (89) Vol. 14, Pt. 2.
- Production and Application of Ultra-Violet Rays, Particularly for Water Purification.\* Max von Rechlinghausen. (Paper read before the Engrs.' Club of St. Louis.) (1) Mar.
- The Yonkers Water Supply and Its Future Development.\* D. F. Fulton. (59) Mar.
- Observations of Some European Water Purification and Sewage and Disposal Plants.\* Edward Bartow. (59) Mar.
- Water Supply Treatment at Council Grove, Kansas.\* Louis L. Tribus. (59) Mar.
- Dry Feed of Chemicals in Water Purification. W. F. Monfort. (59) Mar.
- The Rapid Filter Plant at Evanston, Illinois.\* Langdon Pearse. (59) Mar.
- Pipe Distribution Systems.\* Nicholas S. Hill, Jr. (59) Mar.
- Report of Committee on Water Consumption, American Water Works Association, 1913-15.\* (59) Mar.
- Maintenance of the Water Supply Distribution System of New York City.\* William W. Brush. (59) Mar.
- A Special Water Standard. W. F. Monfort. (59) Mar.
- Water Analysis and the Nitrogen Content of Water. William M. Booth. (59) Mar.
- Air Bound Filters. James M. Caird. (59) Mar.
- The Acquisition of Private Water Plants by Municipalities. B. M. Wagner. (59) Mar.
- Examination of Drinking Water on Trains. Edward Bartow. (59) Mar.
- The Cincinnati Water Works. John W. Hill. (59) Mar.
- New Traveling Screens at Delray.\* C. F. Hirshfeld. (64) Mar. 9.
- Salmon River Power Plant.\* Warren O. Rogers. (64) Mar. 9.
- Testing Small Centrifugal Pumps.\* M. R. Blish. (64) Mar. 16.

\* Illustrated.



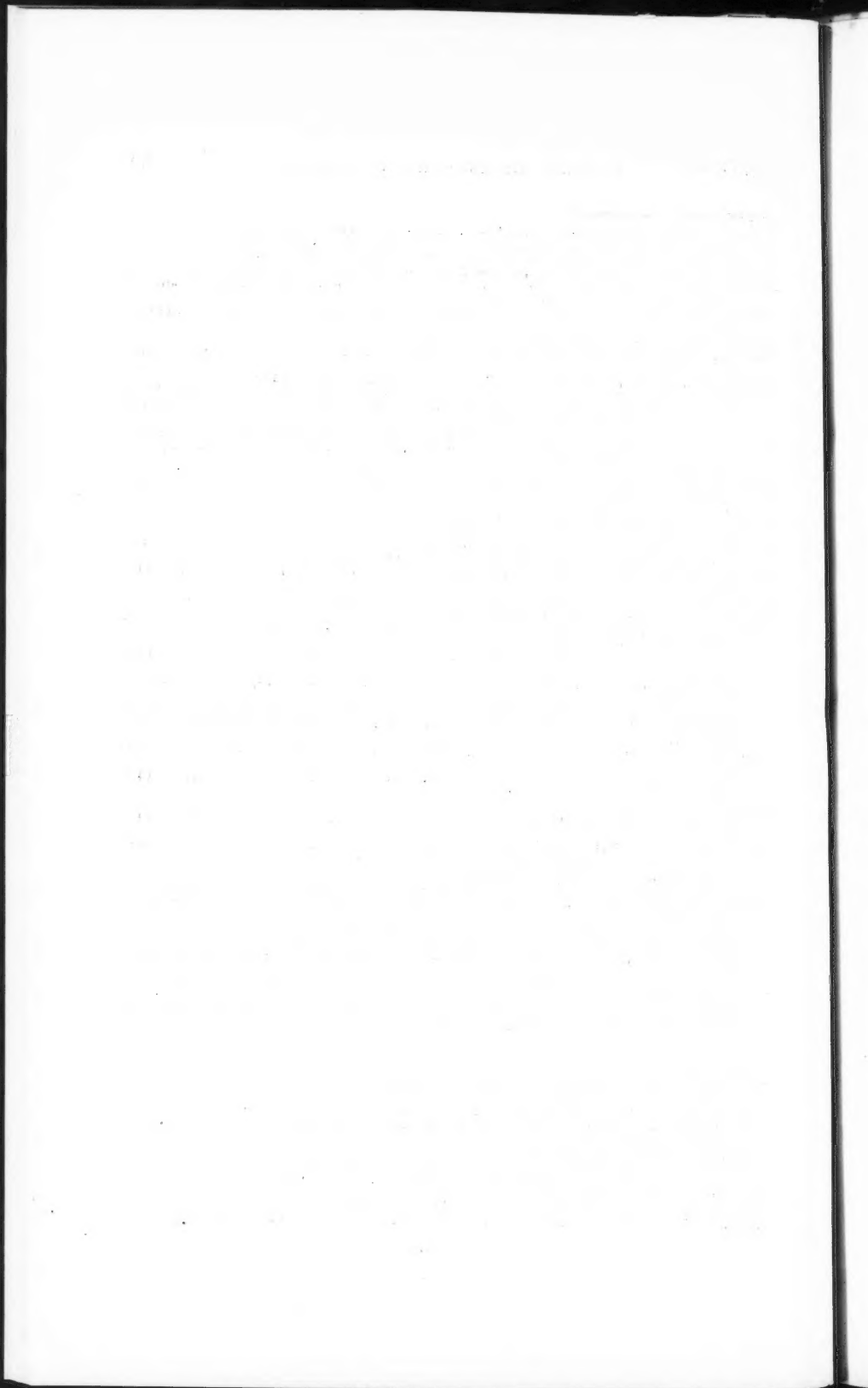
**Water Supply—(Continued).**

- Federal Project at Minidoka, Idaho.\* A. P. Connor. (64) Mar. 30.  
 Spaulding-Drum Power Development.\* John A. Britton. (55) Apr.  
 Development of Water Power in Brazil.\* E. E. Perez. (82) Apr. 3.  
 Design and Cost of New Middle System Reservoir, Duluth, Minn. (86) Apr. 7.  
 Method and Cost of Making Test Borings for the Winnipeg Shoal Lake Aqueduct.\*  
 Douglas L. McLean. (86) Apr. 7.  
 Special Features in the New Intake Tunnel at Milwaukee, Wis.\* Lee G. Warren.  
 (13) Apr. 8.  
 Results with a Novel Surge Tank. (13) Apr. 8.  
 Rock-Fill Dam with Some Extraordinary Foundation Problems.\* M. C. Hinderlider.  
 (13) Apr. 8.  
 Curves for Solving the Hydrostatic Catenary.\* H. M. Gibb. (13) Apr. 8.  
 Concrete Chute Drops Water 130 Feet from Canal to Reservoir, Curious Phenomena  
 of Disappearance of Back-Water Wave, When Chute Begins to Operate  
 Normally.\* D. W. Cole. (14) Apr. 10.  
 Water Filter of New Type, Tested at Toronto, Employs "Drifting Sand" Principle.\*  
 George G. Nasmith and F. Adams. (14) Apr. 10; (96) Apr. 8; (12) Apr. 9;  
 (86) Apr. 21; (13) Apr. 8.  
 Hydro-Electric Power Plant at Chittenden, Vt.\* Thomas Fraher. (64) Apr. 13.  
 Shop Equipment and Motor Trucking Costs, Meter Division of Milwaukee Water  
 Works. Otto F. Poetsch. (86) Apr. 14.  
 Data and Discussion on the Design, Construction and Cost of Reinforced Concrete  
 Standpipes.\* W. G. Kirchoffer. (86) Apr. 14.  
 Method and Cost of Constructing Reinforced Concrete Drops, Canadian Pacific Ry.,  
 Irrigation Projects.\* Robert S. Stockton. (86) Apr. 14.  
 Diagram for Estimating Flow in Channels and Conduits.\* Gilbert D. Fish. (13)  
 Apr. 15.  
 Water-Supply Booster Pumps, Roseland Station, Chicago.\* (13) Apr. 15.  
 The Bombay Hydro-Electric Scheme.\* (12) Apr. 16.  
 Snow Survey Provides Basis for Close Forecast of Watershed's Yield.\* J. E.  
 Church, Jr. (14) Apr. 17.  
 Hydrant Tests in Chicago Indicate Cheaper Maintenance Possibilities.\* (14)  
 Apr. 17.  
 Pumping Water by Compressed Air.\* G. C. Thompson. (From *Engineering Digest*.)  
 (24) Apr. 19.  
 Construction Plant and Methods Employed on New Water Works Intake Tunnel at  
 Milwaukee, Wis.\* George F. Staal. (Paper read before the Wisconsin Engrs.  
 Soc.) (86) Apr. 21.  
 Concrete Lining for Irrigation Canals at Burbank, Wash. Elbert M. Chandler. (13)  
 Apr. 22.  
 Temporary Water Aerator at the Kensico Reservoir.\* Wilson Fitch Smith. (13)  
 Apr. 22.  
 Wilson Ave. Water Tunnel at Chicago.\* (13) Apr. 22.  
 Lahontan Dam, Truckee-Carson Irrigation Project, Nevada.\* D. W. Cole. (13)  
 Apr. 22.  
 New Tunnel, 400 Feet Below Existing Bore, Replaces Short Section of Damaged  
 Catskill Siphon.\* (14) Apr. 24.  
 Earth Fill Replaces Trestle for Irrigation Canal.\* (14) Apr. 24.  
 Cost of Topography for Irrigation Work in British Columbia.\* (86) Apr. 28.  
 Concrete Headgate, South San Joaquin and Oakdale Irrigation District in California.\*  
 (86) Apr. 28.  
 The Alliance Water Filters.\* Thomas Fleming, Jr. (13) Apr. 29.  
 History of Attleboro Standpipe of Reinforced Concrete.\* (13) Apr. 29.  
 Die neue Wasserleitung der Stadt Los Angeles in Kalifornien.\* (51) Serial begin-  
 ning Sup. No. 7.  
 Ueber die Wassergeschwindigkeiten in Rohrleitungen für Wasserkraftanlagen. Ed.  
 Rada. (53) Mar. 5.  
 Ein Mittel zur Bekämpfung der Wirbelbewegung und Kolkbildung unterhalb der  
 Stauwerke.\* Richard Hofbauer. (53) Serial beginning Apr. 2.

**Waterways.**

- The Transportation Problem in Canada and Montreal Harbour.\* Frederick William  
 Cowie. (63) Vol. 198.  
 Crib Construction for Welland Ship Canal.\* (96) Apr. 8.  
 Large Reinforced-Concrete Cribbs Used for Welland Ship Canal Entrance.\* Rex P.  
 Johnson. (14) Apr. 10.  
 Government Wharf at Vancouver.\* (96) Apr. 15.  
 Storm Damage to Sea Walls on California Coast.\* (13) Apr. 15.  
 The Largest Coal Shipping Dock on the Atlantic Coast.\* (23) Apr. 16.  
 River St. Lawrence Ship Channel. (96) Apr. 22.  
 Terminal Improvements at Vancouver.\* (96) Apr. 22.  
 Dredging Work on the Panama Canal Slides.\* W. G. Comber. (13) Apr. 22.

\* Illustrated.



**Waterways—(Continued).**

- Frisco Seawall at Cape Girardeau, Mo.\* (15) Apr. 23.  
Slotted Pipe Aids Placing of Hydraulic Fill.\* A. M. Thompson. (14) Apr. 24.  
Contract Methods and Equipment for a Typical Ohio River Dam.\* Karl H. Shriver.  
(13) Apr. 29.  
Municipal Wharves and Sheds at Los Angeles.\* (13) Apr. 29.  
Experimental Mississippi River Levees Indicate Possibility of Eliminating Seepage;  
Embankments Faced with Concrete and Provided with Sheet Piling at Toe Stop  
Flood Waters that Penetrate Larger Dikes of Standard Design.\* C. O. Sherrill.  
(14) May 1.  
Corrugated Pipe Used Successfully for Culverts, Nestable Sections Found Convenient to  
Place Inside of Failing Timber Waterways under Railroad Embankments.\* (14)  
May 1.

---

\* Illustrated.